THE

REPERTORY

OF

PATENT INVENTIONS,

AND OTHER

Discoveries and Improvements

IN

ARTS, MANUFACTURES,

AND

AGRICULTURE;

BEING A CONTINUATION, ON AN ENLARGED PLAN,

OF THE

Repertory of Arts and Manufactures:

A WORK ORIGINALLY UNDERTAKEN IN THE YEAR 1794, AND STILL CARRIED ON, WITH A VIEW TO COLLECT, RECORD, AND BRING INTO PUBLIC NOTICE, THE USEFUL INVENTIONS OF ALL NATIONS.

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PATENT INVENTIONS.

No. 1. Vol. XXI. ENLARGED SERIES.—JANUARY, 1853.

Specification of the Patent granted to Henry Bessemer, *of Baxter House, Old Saint Pancras-road, in the County of Middlesex, for Improvements in Expressing Saccharine Fluids, and in the Manufacture, Refining, and Treating Sugar.*—Sealed February 24, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— First, my invention consists in certain improved modifications of presses used for expressing the saccharine juice of the sugar-cane.

Secondly, in the mode of constructing "clarifiers," and in the clarification of cane-juice or other saccharine fluids in the manufacture and refining of sugar.

Thirdly, in a method or methods of evaporating and concentrating saccharine fluids without boiling or bringing such fluids in contact with pipes or surfaces heated by fire or steam.

Fourthly, in an improved "cooler" or crystallizing vessel; and,

Lastly, in an improved mode or modes of "curing"

sugar or separating the mother-liquor or molasses from the crystals of sugar.

First, with regard to my improved modification of the cane-press used for expressing the saccharine juice of the sugar-cane. The improvements comprehended under this head of my said invention are represented on Sheets A and B of the drawings annexed.

On Sheet A, fig. 1 represents a longitudinal elevation of the improved cane-press.

Fig. 2, a longitudinal vertical section on the line, A, B, of fig. 3.

Fig. 3, is a plan with the hoppers removed.

Fig. 4, a horizontal section on the line, C, D, of fig. 2.

Fig. 5, an end elevation.

Fig. 6, a vertical cross section on the lines, E, F, of figs. 2 and 3; and

Fig. 7, is a vertical cross section on the line, G, H, of figs. 2 and 3. The cast-iron frame or bed-plate, *a*, of the machine is cast in one piece, and has formed upon it at opposite sides two square recesses into which the brass bearings, *b*, are fitted. These brasses are divided vertically and have a wedge-shaped piece, *s*, (shown by dots,) fitted between one of them and one side of the square recess. This wedge-shaped piece has a screw, *c*, passing through a projection formed on the back of it, by means of which the wedge is either raised or lowered into the recess, and by this means the brasses are tightened or loosened as may be required; the brasses, *b*, are retained in their places by flanges on each side, and are prevented from rising out of their seats by a cap, *d*, which is firmly bolted to the frame, *a;* this cap is arched and rests on both sides of the frame, the central or arched part, d^*, also serving as a guide for the cane-pistons, *e;* the brasses, *b*, are for the purpose of supporting the end journals, f^1, of the crank, *f;* this crank I prefer to be formed by first turning a plain cylindrical mass of iron and then placing it eccentrically in the lathe, and cutting or turning away a part of it until it is reduced to about half the diameter, the reduced part forming a crank-journal, further on the cylindrical mass is treated in like manner, in as many places as there are crank-throws to be formed thereon, each throw being placed further round the cylindrical mass, so as to act in succession at equal intervals of time during each revolution of the shaft; a crank constructed in this manner is shown in elevation at fig. 9,

and in cross section at fig. 8; *f*, is the plain cylindrical part between the throws, and f^1, are the journals on which it revolves; f^2, f^3, and f^4, are the crank-throws, as shown by dots in fig. 8; the crank-shaft is shown broken off at f^*, where it may be connected to a steam-engine or other first mover.

There are three recesses formed on the upper side of the bed-plate, *a*, which are planed out so as to fit accurately the pressing tubes, *g*, which are also planed true so as to fit the recesses in the bed-plate; the tubes are prevented from being pushed out of their position by a rib or projection, g^*, fig. 2, which is cast on the under side of them, and are prevented from rising by having a cast-iron frame, *h*, bolted down to the top of the frame, *a*, the cross-bar, h^1, passing over one end of them, and the part, h^2, passing across the other end, and at the same time serving also as the base of the hoppers, *i*; the end, h^3, of the frame, *h*, overhangs the frame, *a*, and has a board, *t*, fitted into it, and covered with thin sheet-copper on its under side to protect it from the splashing of the juice; there is also a similar board, *u*, fitted into the frame, *h*; these boards are moveable, so as to afford access to the tubes, they also serve the purpose of a stage on which the feeder stands to put the canes into the hoppers, *i*.

The pressing tubes, *g*, have pistons or plungers, *e*, fitted into them; one end of the plungers have a recess formed in them, and have a cap, e^1, secured by bolts on to the end of them, in such a manner as to form a rectangular slot, in which is fitted a pair of brasses, *l*; these brasses have flanges to keep them in place, and are fitted to the eccentric parts or throws of the crank, f^2, f^3, and f^4. A portion of the bed-plate, a^1, is planed true, and between it and the underside of the piece or cap, d^*, the enlarged end of the plungers, e^*, are fitted, so that the space between the surfaces, a^1, and d^*, forms a guide for the plungers and ensures their parallel motion, backward and forward when actuated by the crank. The gland, *m*, fits into a recess formed at the end of the pressing tubes, and causes the packing, *n*, to keep a close joint and prevent the backward flow of cane juice, which might otherwise flow on to the part, a^1, and mix with the oil used to lubricate it. The supply of oil to these working parts is given from oil cups, d^2, which are placed above each throw of the crank, and by suitable channels it is allowed to flow on to the brasses

and sliding parts; the hoppers, *i*, are cast in one piece, and are secured by bolts passing through the flange, i^2, to the frame, *h*.

The pressing tubes are rectangular in cross section and of much less length than those heretofore used in machines made according to my former patent, and as the interior of them is difficult to plane out and render true, I prefer to cast them on an iron bar or core, which is made very accurate, and heated previously to casting the tube thereon; and as an alloy of forty parts zinc and sixty parts copper (known as Muntz's metal) will bear the application of force while hot much better than common brass, I prefer to make the tubes of this alloy in order that the iron core may be forced out while the metal is hot, or otherwise the shrinking of the cast metal on the iron core renders the latter extremely difficult to remove, and endangers the soundness of the casting. To prevent the bursting of the tubes by the pressure within them when in use, ribs, g^1, are cast upon them, which abut against each other and are sustained by similar ribs, a^3, formed on the bed-plate, *a*, so as to form a mutual support for each other; one of these tubes is shown detached in fig. 10, which is a side elevation, and at fig. 11, which is a plan of the same. When rotatory motion is communicated from any first mover to the crank-shaft, *f*, and canes are put into the hoppers, *i*, the plungers or pistons, *e*, will move forward, and the cutter, *w*, which is fitted on to and forms the top angle of each plunger, will cut off a piece of cane equal in length to the height of the interior of the tubes, *g*, each of the plungers, *e*, acting in succession will cut off a piece of cane and carry it forward into their respective pressing tubes. After several pieces have been cut off in each tube the force required to push them forward through the contracted part of the tube, will cause them to be crushed and flattened out, and thus still further increase the resistance which they offer to the moving power, which tends to expel them at the open end of the tubes. When in this manner the tubes are filled the apparatus will be in a suitable condition to continue the operation of expressing the saccharine fluid.

It will be observed by reference to fig. 2, Sheet A, that the canes which are put into the hoppers, *i*, fall down to the bottom of the pressing tubes whenever the plunges are drawn back, and in their forward motion that portion

of the cane which is within the tube is cut off and pushed against the mass of canes therein contained; and as it requires a great amount of force to move the mass of canes forward, the piece of cane last cut off is flattened out, whereby the cells containing the saccharine juice are burst, and the juice forced out through the numerous perforations made in the tubes for that purpose; but as the cane is partly composed of solid matter which cannot escape through these perforations, every new piece that is cut off and pressed, must, therefore, move forward the mass a distance equal to its own thickness when in a compressed state, and thus discharge at each stroke a portion of the compressed cane or "bagas" at the open end of the tube. In the cane presses heretofore made the pressing tubes have been made parallel or nearly so throughout, and of much greater length than those represented in the annexed drawings, the resistance opposed to the escape of the canes through the tubes being chiefly or wholly caused by the friction of the "bagas" in passing through the tube; now it has been found that the elasticity of the "bagas" in such a long tube tended to prevent the crushing of the cane by forming a sort of cushion for it, and also produced an irregular action of the machine by not allowing each new portion of cane when pressed to expel another piece at the opposite end of the tube. These disadvantages are obviated in the present invention by forming the pressing tubes in the manner represented in the annexed drawings, and causing the resistance necessary to crush the cane by forcing the "bagas" (which has once been squeezed out so as to occupy the wider part of the tube) through the taper part, g^2, thereof, and afterwards forcing it along the narrow parallel part, g^3, of the tube; this change of form taking place while the canes are under pressure will assist the disruption of the cells in which the juice is contained, and facilitate its removal from them while the quantity of "bagas" contained in the wide part of the tube is too small to prevent the proper crushing of the cane by its elasticity.

It will also be observed that the crank, as herein represented, will cause the pistons to act in succession, so that the great resistance opposed to the pistons during the last portion of their forward movement, will have ceased in one tube before it is commenced in another, and thus much of the strain is taken off the machine by their moving one

after the other, instead of moving simultaneously as hereto-fore practised.

The spaces, *p*, between the supporting ribs allow that portion of the juice which escapes laterally to fall down into the shoot, *q*, from whence it may be conveyed to the "clarifiers." The framing, a^4, at the end of the press contains a drum, *r*, shown by dots, over which an endless web passes for the purpose of carrying away the "bagas" which slides down the inclined plate, r, on to it. In order to strengthen the pressing tubes I sometimes cast one or more circular flanges upon them, and when the edge of these flanges are turned true, I shrink an iron or steel ring upon them, in a manner well understood; a tube so constructed is represented on Sheet A, where

Fig. 12, is a side elevation; and

Fig. 13, a cross section, *x*, is the tube, *y*, the flange cast thereon, and *z*, the steel rings shrunk upon them.

In the cane-press represented on Sheet A, I have shown only three pressing tubes, but I do not confine myself to that number, because other numbers may be used in the same manner by making the requisite number of throws upon the crank-shaft, and otherwise adapting the apparatus thereto; but when it is desired to increase greatly the number of pressing tubes I prefer to construct a double-acting machine, which I have represented on Sheet B, of the annexed drawings, where

Fig. 1, is an elevation; and

Fig. 2, a longitudinal vertical section, through the centre of the machine.

In this modification of the apparatus the crank-shaft, A, is placed across the centre of it, and equi-distant between two sets of pressing tubes, B and C; the plungers, D and E, are bolted end to end, and in the slot, L, formed between them; the brasses, F, move up and down when the crank-shaft is in motion. The general details and arrangement of this apparatus are the same as that before described and represented on Sheet A, with the exception of such parts as are necessarily modified in form or position to suit its double action. In both the forms of apparatus herein lastly described it will be seen that the plungers have their motion rendered rectilinear by working in between the bed-plate, N, and the covering plate, S, which extends across the frame and fits down upon them, but in some cases I

prefer to dispense with these guides, and connect one end of the plungers direct with the cranks, in which case I lengthen the plungers a little in order to lessen the angle formed by their oscillation; this renders it necessary to lengthen the frame or bed-plate to a like extent, but does not otherwise greatly interfere with the general arrangement or construction of the machine.

In order that this modification may be fully understood I have shown in fig. 3, Sheet B, a longitudinal vertical section through the centre of the machine, where G, is the crank-shaft, and H, one of the plungers, which has a pair of brasses, J, fitted thereto, in which the throw of the crank revolves. These brasses are tightened up by a cap, K, in a similar manner to that usually employed to tighten the brasses of plummer-blocks; the opposite end of the plunger has a steel-piece, R, fastened upon it, the lower angle of which is rounded so as to slide freely on the lower side of the tube, T. The depth of the plunger is also reduced by a gradual taper to the part, H*, where there is a thin plate of metal extending around it to prevent any juice that may escape from the end of the tube from splashing against the crank; Q, represents another plunger seen partly in elevation above the plunger, H, and partly by dotts. As the crank revolves these plungers rise and fall at that end where they are united to the crank, while the other ends of them move within the tubes in a right line, the face of the plungers being thrown slightly out of the vertical line during the time they are receding from or approaching the end of their stroke, at which time they become truly vertical.

The great resistance which the plungers have to overcome towards the end of their stroke renders it necessary that great strength should be given to all parts of the framing to enable it to withstand the force thus exerted upon it. The lateral pressure of the canes within the tubes must also be borne by the frame against which the sides of the tubes abut. In order to provide most fully against these powerful strains I sometimes make use of tension-rods of wrought-iron, so placed as to bear the chief strains to which the machine is subjected; the mode of doing this will be better understood by reference to Sheet B, where

Fig. 4, is a longitudinal vertical section; and

Fig. 5, a cross section of a frame similar to that repre-

sented in figs. 1 and 2, Sheet B, with the exception of the tension-rods.

These rods, P, P, are made of wrought-iron and of considerable strength, they are made to pass entirely through the main cross ribs, S, S, of the frame, and thereby receive the thrust of the plungers in each direction; V, V, are also similar tension-rods, which pass across the frame and prevent the lateral pressure exerted within the tubes from injuring the main framing of the machine; these tension-rods have heads forged upon them at one end, and are secured at the other by screwed nuts, as shown, or they may be tightened up by cotters passing through slots formed therein.

Secondly, with regard to my invention in the mode of constructing clarifiers and in the clarification of cane juice or other saccharine fluids in the manufacture and refining of sugar. The vessels or clarifiers heretofore generally used are either heated by fire applied direct to the underside of them or by steam contained in a jacket or double-bottom, the jacket of these vessels is of a hemispherical form, and is secured by bolts to a stout flange extending around the vessel. The force of the steam exerted over the whole area of the bottom of the pan has to be sustained by this flanged joint of the jacket, while the hemispherical form of the bottom which is required to sustain this pressure, causes the admixture of some of the deposited matters with the fluid which is drawn off; this admixture takes place as soon as the liquid is drawn off from the upper cylindrical portion of the vessel, and while it is sinking down in the curved part the slight motion of the margin of the fluid's surface disturbs the deposit upon the curved bottom of the vessel.

In order to prevent this admixture of impurities with the liquor that should be drawn off clear from the clarifiers, and to save much of the expense of construction caused by the great tendency which the pan and jacket have to be separated from each other by the force of the steam, I construct a vessel or clarifier, as represented on Sheet C, of the drawings annexed, where

Fig. 4, is a vertical section through the centre.

Fig. 5, a horizontal section; and,

Fig. 6, an elevation. *a*, is a cast-iron cylindrical vessel having a nearly flat bottom, which has hollow chambers, a^1, formed around it; the bottom of the vessel, a^2, being con-

nected by vertical radial partitions (which are shown by dots in fig. 5) to the lower part, a^3, which forms part of the same casting; *b*, is a cylindrical jacket, which fits on to the vessel, *a*, and has a caulked or rust-joint at *c*, both at top and bottom, and leaves an annular space, *d*, around the vessel for the admission of hot water or steam, the pressure of which has no tendency to move the jacket either upwards or downwards, and is therefore amply secured by the rust-joint, *c*. To strengthen the jacket, a flange, b^1, is formed at the upper end, and a similar flange, b^2, at the lower end of it, these flanges have a recess formed in them for the purpose of holding the wood-jacket, *e*, which has projecting parts, *e**, at each end fitting into the annular recess of the flanges, b^1 and b^2, and thus keep the staves of the wood-jacket firmly in place, there being a portion of the projecting part of the flange removed for the insertion of the staves; *f*, is a cock for drawing off the clear liquor by one passage through it, and for drawing off the sediment by another, in which case the plug, *g*, is lifted up in the manner commonly practised. Steam or hot water heated in any convenient way is to be applied by a cock and pipe to any part of the jacket, *b*, communicating with the annular space, *d*, another similar pipe and cock being connected with the jacket, *b*, on the opposite side and at the lowest part of it, in order to draw off the condensed steam, if steam be used as a heating medium, or for the purpose of keeping up the circulation of water, if the clarifier is intended to be heated in that manner.

When saccharine fluids have been heated with lime or otherwise in the "clarifiers" or "blowing-up pan," a certain quantity of flaculent matter will be found mixed with the fluid, and may be separated therefrom by allowing the matters to subside, when this is done in the clarifier the heat of the vessel causes motion in the fluid and retards this operation, and as it cannot be seen whether the fluid is clear or otherwise without drawing it off, the process is rendered very uncertain. To avoid these disadvantages I construct a subsiding vessel in the manner represented in Sheet C, of the annexed drawings, where

Fig. 7, is an elevation;

Fig. 8, a horizontal section; and

Fig. 9, a vertical section. A, A, are two stout pieces of slate having grooves at A*, formed in them from top to bottom; B, B, are two stout plates of glass inserted into the

grooves of the slate and cemented therein with white lead; C, is an iron frame fitted on to the top of the vessel and bolted to the slate sides, so as to hold the whole together securely; D, is also a frame of iron for the purpose of securing the lower part of the slate and glass sides of the vessel; E, is a stout slab of slate forming a bottom to the vessel, through this piece passes a pipe, G, having a cock at its lower end. The pipe, G, is made smooth and parallel, in order that it may slide freely up and down through an "hydraulic leather" or collar, H, which prevents the escape of any fluid on the outside of the pipe, the fluid to be clarified is let into the vessel, which should be placed about two feet from the floor and with a window behind it, so that the precise state of the fluid at all parts of the vessel may be readily observed. When sufficiently clear the cock is opened and the fluid allowed to escape, the pipe, G, being drawn slowly and steadily downwards, so as to draw it off to such a point as the appearance of the fluid renders desirable. By afterwards lowering the orifice of the pipe, G, level with the bottom of the vessel, the whole of the impurities may be drawn off previous to a repetition of the process.

Thirdly, with regard to my invention of a method or methods of evaporating and concentrating saccharine fluids without boiling or bringing such fluids in contact with pipes or surfaces heated by fire or steam. In order that this part of my said invention may be fully understood and in what respect the same differs from other methods of evaporating saccharine fluids already known or practised, I will first give a brief description of some of these methods, and then proceed to explain the manner in which I accomplish this object. The evaporation of the saccharine juice of the sugar-cane has for a long period of time been effected by applying fire to the bottom of the vessel containing the fluid to be evaporated, and this method is still extensively used in the British colonies, but it has been found that saccharine solutions when exposed to a high temperature soon acquire a dark colour, part of the sugar being converted into glucose and rendered uncrystallizable, in which form it is more generally known as molasses. To lessen this evil various modifications of apparatus have from time to time been used, in which heat is transmitted to the saccharine fluids by steam circulating in pipes, which pass through and among the fluid, and thus impart the heat

necessary to boil it, and throw off the aqueous portions in the form of steam; it further being found that boiling by steam also produces an injurious effect on saccharine fluids, and to remedy which numerous attempts have from time to time been made. The apparatus invented by Howard for this purpose and well known under the name of "the vacuum-pan," is intended to lessen such injurious effects by causing the fluid to boil and throw off vapour in a close vessel or pan, in which a partial vacuum is maintained by a suitable condenser and air-pumps, the boiling point of such fluid being lower in a vacuum-chamber than when under the influence of the atmosphere. The heat, however, required to produce ebullition in the vacuum-pan is transmitted thereto by steam-pipes, which pass in and among the fluid to be evaporated, the lower side of the pan being double or "jacketed" for the purpose also of containing steam. Since the period of Howard's invention other means have been devised and patented for evaporating saccharine fluids in such manner that the bulk of the fluid should be maintained below the temperature at which such fluids boil in the open air. To effect this object Mr. Cleland invented an apparatus in which a convoluted worm or tube is mounted on a horizontal axis, extending across the evaporating-pan or vessel, in such manner that a portion thereof is immersed in the fluid to be evaporated, to assist which steam is made to pass through the convoluted tube, and as it revolves upon its axis a thin coating of the fluid is taken up upon it and exposed to the action of the surrounding atmosphere. In order to heat the fluid to be evaporated the pan or vessel is constructed with a chamber below it containing steam, which steam by contact with the bottom of the evaporating-pan transmits heat to the fluid in which the revolving tube is partly immersed. After the publication of this invention a patent was obtained by Mr. Augustus Gadesden, which invention consists of a revolving cylinder or drum composed of bars or tubes; this drum is mounted on an axis which extends across the pan, and at such a height above it that the bars of the drum as it revolves may dip into the fluid to be evaporated, a thin coating of which is taken up upon them and exposed to the atmosphere whereby it becomes cooled and assists in lowering the temperature of the fluid in the pan. The pan or vessel is usually enclosed in a furnace, and fire is applied direct to the under side of it for the purpose of heating

the fluid therein. In like manner plain circular discs or plates of metal have been mounted on an axis and made to dip into the fluid to be evaporated, and take up upon their surfaces a thin coating of it, which is thus exposed to the cooling influence of the atmosphere and at the same time assists evaporation.

On the 15th of April, 1851, a patent was obtained by Mr. Herman Schroder, for "Improvements in manufacturing and refining sugar," which consist of a combination of steam pipes with revolving discs.

Other plans have also been proposed in which air has been forced below the surface of the fluid and allowed to bubble through it, and thus keep down the mean temperature of the bulk of fluid below the point at which the same would boil in the open air.

Before entering into the details of my apparatus for evaporating saccharine fluids, I wish it to be understood that I have discovered that in all cases and in all forms of apparatus in which solutions of sugar are brought in contact with metal tubes or surfaces heated by steam, that the heat thus transmitted produces an injurious effect on such saccharine matter, and also that to prevent such injurious effects of heat it is not sufficient that the mean temperature of the fluid should be kept below the boiling point of such fluid in the open air, by exposing it in thin films or coatings to the cooling action of the atmosphere, while at the same time other portions of the fluid are in contact with metal heated by fire or steam, whereby the low mean temperature of the saccharine fluid in the pan is the joint effect of exposing such fluid to an injuriously high temperature in one set of surfaces, and to an unnecessarily cool one on others, and is not the result of the application of heating media at a low temperature, as in my invention, which is hereinafter described.

In all cases where I apply heat to the bulk of the saccharine fluid in the pan I prefer that the surfaces used to transmit such heat shall not exceed a temperature of 140 or 150 degrees of Fahrenheit, and as ebullition cannot take place at this low temperature I force large quantities of heated air also at about 140 or 150 degrees Fahrenheit in contact with the fluid, which has the effect of keeping it at an uniform temperature, and of absorbing the aqueous portions of such fluid, which passes off in combination with the air as an invisible vapour. The apparatus for carrying into

effect this part of my invention is represented on Sheet D, of the drawings annexed, where

Fig. 1, is a cross section on the line, A, B, of fig. 4.

Fig. 2, is a longitudinal vertical section on the line, C, D, of fig. 1.

Fig. 3, is an end elevation.

Fig. 4, is a side elevation; and,

Figs. 5, 8, 9, 10, and 11, details of the same. *a*, is a tank or vessel constructed of plate-iron or other suitable material for the purpose of containing water, which is kept at any desired temperature by the pipes, *b*, which pass through it and are heated by steam, the upper part of the tank has a close cover riveted thereto, which is hollowed out so as to form the sugar-pan, *c*, the central portion of which is accurately curved, forming a segment of a cylinder, the rivets being countersunk, and the plates put together with butt-joints, so as to leave no projections on the inside of the pan, *c*. At each end of the tank there is formed bearings, d^1 and d^2, for the purpose of supporting a large tubular axle, which is closed at one end by a suitable cover, e^1, this cover is elongated and forms an axis, e^2, on which that end of the tube is supported, the opposite end of the tube, e^3, is open and rests on the bearing, d^1.

The tubular axle, *e*, has a screw thread on it, as shown at *f*, *f*, fig. 5, this thread is to be about a quarter of an inch in depth, and of such breadth as to fit a plate of sheet-metal, which is to be inserted therein, the distance between the convolutions I prefer to be from half an inch to one inch, but it is by no means limited to these dimensions.

Fig. 11, represents a plate of metal, *g*, having a circular hole in its centre of about half an inch less in diameter than the axle, *e*, the plate, *g*, has a slit cut in it at g^1, and each edge of the metal next to this slit is reduced to half its thickness, in order that a similar edge of another plate may be riveted thereto without increasing the thickness at that part; this joint is shown on a larger scale at g^2, fig. 10; two plates thus united are represented at fig. 9, where *i*, shows the riveted junction, or instead of this mode of uniting the plates, the edges may be "ploughed and tongued," as represented at *h*, in fig. 8; a number of circular plates thus prepared are sprung sufficiently to cause their inner edges to be inserted in the spiral groove or thread of the axle, *e*, on which they are fitted and riveted together, the plates assuming the form represented in fig. 9. When as

many plates are thus put on as will occupy the spiral groove from end to end, a larger screw will be formed by them, as represented in figs. 2 and 4. On that part of the axle, *e*, which intervenes between the spiral blades or threads of the screw a great number of holes are drilled into the interior, shown at *n*, these holes extend entirely around the axle at a distance of a few inches apart, and are for the purpose of admitting jets of air in between the convolutions of the screw.

The action of the apparatus is as follows:—The tank, *a*, is first filled with water by the opening, *m*, and steam is admitted to the pipe, *b*, which consists of several lengths united by bends at each end, so as to form a continuous passage for the steam to pass through, or instead of these pipes fire may be applied to the underside of the tank, *a*, the object in either case being to heat the water which forms a bath for the sugar-pan, against the underside of which the water is in contact; a thermometer may be inserted in the opening, *m*, for the purpose of ascertaining the temperature of the bath, which I prefer to use at 150 degrees Fahrenheit. The opening, *m*, is left open to the atmosphere in order to prevent (even with carelessness) the water from being raised above 212 degrees Fahrenheit, and consequently so as to prevent latent heat of steam from acting upon the metal against which the saccharine fluid is in contact; and although I have herein described water, as being used as a heating medium, the heat may be transmitted to the fluid in the pan by heated air or by any liquid or aeriform fluid whose temperature is below 212 degrees Fahrenheit, or the process of evaporation may be carried on by the application of heated air to the fluid on the surfaces of the moving or revolving apparatus without any application of heat to the bulk of fluid in the pan otherwise than what it may obtain from the revolving apparatus which becomes heated by the air brought in contact therewith.

I also use a blowing-fan or other convenient air-forcing apparatus which I connect with a pipe; one end of this pipe is inserted into the open end, e^3, of the hollow axis of the screw; the air so forced I prefer to heat to about 150 degrees Fahrenheit, by the application of heat to the pipe which conveys it to the evaporating apparatus, or by any convenient mode of heating air already known and practised. The saccharine fluid is let into the pan so as

nearly to fill it; rotatory motion is then to be communicated from any first mover to the axle, *e*, by means of the drum, *s*, which should revolve at the rate of about eight or ten revolutions per minute. As the screw revolves it will take up upon its surface a thin coating of the saccharine fluid, and as the heated air rushes out of the numerous holes in the hollow axle, it will be brought in contact with the thin stratum of fluid thus presented to its action, the aqueous portions of the fluid will be absorbed by the air and carried off in combination therewith, while the saccharine fluid on the screw which has thereby become more dense, will again descend into and mix with the fluid in the pan, while fresh portions are rising out of it, to be acted on in like manner. As the quantity of fluid in the pan diminishes by evaporation, fresh portions should be added until the requisite density is attained.

To prevent the deposit of sugar or the formation of a concrete mass on the bottom of the pan, I cause the screw to be fitted so as to come almost in contact with the bottom of the pan, whereby the blades of the screw will form a scraper and remove any such deposit or concrete matter to one end of the pan; this tendency to bring the charge to one end of the pan renders it necessary to leave room on both sides of the screw at c^1 and c^2, for the fluid to return to the opposite end of the pan, and thus keep up a circulation of the fluid during the whole process. When the charge is sufficiently concentrated, the sluice, *t*, is opened, and the screw continued in motion, which will greatly facilitate the discharge of the syrup from the pan, which can then be refilled, and the process continued as before.

After the concentrated syrup leaves the pan it should be heated before being allowed to crystallize, as already practised with syrups concentrated in the vacuum-pan.

Although the spiral blade or screw herein described affords great facility in discharging the contents of the pan and in scraping the bottom of it, nevertheless plain circular plates or discs may be used instead, and as this difference will not affect the general arrangements of the apparatus, I have shown only a portion of a hollow axle with plain discs in fig. 6, Sheet D. *u*, is the axle; *v*, the discs, and *w*, the holes, through which heated air is forced between the discs to cause the evaporation of the fluid taken up upon their surfaces; and although I prefer to force heated air from the centre of such discs it will never-

theless be obvious that a similar though less perfect result may be obtained by forcing such heated air between discs mounted on a solid axis, as represented in fig. 7, Sheet D, where *x*, represents the discs; *y*, the solid axis; and *z*, a pipe placed parallel thereto, and perforated on that side next to the discs, so that heated air may be forced between and in contact with the wet surface of the revolving discs.

Although I have herein described the mode which I prefer, of evaporating saccharine fluids by taking up thin films or coatings thereof upon revolving surfaces, it will nevertheless be obvious that plates or surfaces made to reciprocate or otherwise move into and out of the fluid to be evaporated may also be made to take up the fluid upon them, and expose it to the action of heated air, and may therefore be used as a means of carrying into effect this part of my invention; and further, instead of using revolving or moving surfaces as a means of exposing thin films of saccharine fluid to the action of heated air, fixed plates or surfaces may be used in a vertical or inclined position, without being heated otherwise than by the heated air, which is forced between them for the purpose of absorbing the aqueous portions of such fluids; these plates or surfaces may be placed in an upright tank or vessel open at the top for the escape of the heated air and vapour, and connected at bottom with a pipe or trunk through which heated air is forced by a fan-blower or other suitable means, and thus a strong current of heated air will be made to sweep over the wet surfaces and produce a rapid evaporation; the plates or surfaces may be placed within a quarter or half an inch of each other, and the fluid allowed to flow on to the top end of them from perforated pipes in connexion with a reservoir, which may be supplied by a common lift-pump from a tank or vessel into which the fluid falls after passing over the plates, and thus a repetition of the process may be carried on until the fluid has arrived at the desired density; I have not hereunto annexed any drawings of such apparatus because the form and arrangement thereof will be readily understood by any workmen, and admits of great variation without affecting the principle on which it depends.

It sometimes happens that owing to certain interruptions caused by the state of the weather or by other circumstances, that a portion of the crop of canes on an estate

is in danger of being lost or spoiled, unless they can be used with great expedition, and whenever from this or other causes it is requisite to increase the evaporative power of the apparatus herein described, I either increase the temperature of the air up to or above 212 degrees Fahrenheit, or I turn on steam from any suitable boiler into the jacket or tank below the pan, the opening or openings, *m*, being closed for this purpose, and a pipe attached to the tank, *a*, in connexion with a steam-boiler, to which mode of heating separately I make no claim. I thus increase the rate of evaporation, considering it preferable in such emergencies to produce an inferior sugar, to allowing the same to be entirely wasted from want of the means of sufficiently rapid evaporation.

Fourthly, with regard to my improved "cooler" or crystallizing vessel. When hot concentrated syrups are exposed to the cooling action of the atmosphere in large shallow vessels, the sudden change of temperature which is caused thereby converts the syrup into minute and ill-defined crystals, which are difficult to separate from their mother-liquor, and are less esteemed than sugar with a coarser grain. In order to obtain a larger crystal and to save much of the labour and waste occasioned by the transfer of the syrup and sugar from place to place, I construct a cooler in the manner represented in Sheet C, of the annexed drawings, where

Fig. 1, is an elevation.

Fig. 2, a plan; and

Fig. 3, a vertical section. A, is a cooler constructed of wood and secured by iron hoops, B; the bottom of the vessel is conical for the purpose of facilitating the discharge of matters therefrom whenever the plug, C, is lifted up; D, is an iron band extending around it, to which two of the wheels, E, are attached by a jointed-arm, G; there is a third wheel, H, on one side, to which the handle, J, is attached, so as to guide the wheel and cause the vessel to move in any direction in which the handle is pulled, and thus enables it to be brought to the concentrating-pans to receive a charge of syrup and then to be wheeled away to the curing-house. The vessel being made of wood which is a slow conductor of heat, and also of a form which presents very little cooling surface in proportion to the bulk of matter it contains, a very gradual cooling of its contents

will take place, and thus afford time for the formation of larger crystals, and also increase the facility with which their mother-liquor may be separated therefrom.

Lastly, with regard to my improved mode or modes of "curing sugar" or separating the mother-liquor or molasses from the crystals of sugar.

In the ordinary mode of manufacturing sugar the mother-liquor or molasses in which the crystallized portions of the sugar are contained is imperfectly separated by making an opening in the bottom of the vessel through which the semi-fluid matters are allowed slowly to drain, leaving the crystals with a small film or coating of the molasses still adhering to them, which darkens the colour and adds much to the impurity of the sugar. Several modes intended to prevent the disadvantages arising from this imperfect separation of the molasses have been used, but it has been found that much labour and loss of sugar results from their use.

If crystallized sugar containing a small quantity of molasses is brought in contact with water a union of the water with the molasses will rapidly take place. The water will also dissolve the crystallized sugar if suffered to remain in contact for a sufficient time, but as the molasses are on the exterior surface of the crystal and exist in a semi-fluid state, there must necessarily be a period of time (after the addition of water) when the molasses have become united therewith, and the solution of the solid crystals have not yet commenced; this being the case it must therefore follow that if we can bring water in contact with sugar for the short period of time only which is required for it to unite with the molasses, and then as rapidly take it away, that the water so withdrawn will carry with it the molasses in solution while the washed crystals of sugar will be left in a clean state. In order to carry into practice this mode of "curing" or cleansing sugar, I construct an apparatus as represented in Sheet E, of the annexed drawings, where

Fig. 1, is an elevation.

Fig. 2, an elevation taken at right angles to the elevation fig. 1.

Fig. 3, a vertical section near the line, A, B, of fig. 5.

Fig. 4, is a horizontal section on the line, C, D, of fig. 1.

Fig. 5, a plan; and

Figs. 6 and 7, details on a larger scale. *a*, is a circular

cast-iron frame with arched openings, for the purpose of affording access to the interior of it; *b*, is a circular table having a hollow axis, b^1; the upper side of the table has a central covering plate, b^2, which is united to the part, *b*, by six vertical ribs, b^3. Around the upper side of the table there is formed a large annular opening, over which is fitted an annular plate of brass, *c*, which is secured to the table by screws and flanges, *d*. The upper side of the plate, *c*, has a number of concentric grooves formed in it, the spaces or ribs between the grooves being very thin and terminating upwards with a nearly sharp champhered edge. Between each of these ribs a row of holes is drilled all around the plate, so as to establish a communication at numerous parts between the upper side of the plate, *c*, and the hollow table, *b*; *e*, and *f*, are two rings of brass, which have an annular ring of wire-guaze, *h*, soldered to them. The rings, *e* and *f*, with the wire-guaze attached to them are fitted on to the plate, *c*, so that the wire-guaze comes in contact and is supported by the thin annular ribs formed thereon, the whole being secured by screws passing upwards through the plate, *c*, and screwing into the rings, *e* and *f*; this will be better understood on reference to figs. 6 and 7, which show a portion of the plate, *c*, in plan and section on an enlarged scale; c^1, are the holes, and c^2, the ribs, which support the wire-guaze covering; the rings, *e* and *f*, project upwards a short distance and thus form a shallow annular trough or channel with a pervious bottom, which extends all around the upper edge of the table, *b*; the base-plate of the frame, *a*, is raised in the form of a dome, a^1, in the centre of which there is a gland, *i*, which forms a stuffing-box around the hollow axis, b^1, of the table for the purpose of preventing the external air from entering the dome, a^1. On the under side of the base-plate of the table there is bolted a cover, *j*, through the centre of which the main air suction-pipe, *l*, passes upwards, terminating with an open end at l^*; the cover, *j*, has a recess or annular space, *m*, formed, between the lower part of it and the pipe, *l*, and leading into this space is the exhaust liquor-pipe, *n*. To prevent any fluid from falling into the open end, l^*, of the air-pipe, a large covering-plate, *p*, is placed above it, being retained in its position by radial ribs, *q*, by which it is firmly attached to the cover, *j*, the upper side of the covering-plate, *p*, receives the end of the small axis, *r*, which is keyed into the boss, *s*, this boss is supported by arms, *t*,

cast in the lower end of the hollow axis, b^1, of the table, and thus forms a support for the table, b, and an axis on which it may revolve. On the under side of the table is a ring, b^5, on which cogs are formed, and has a bevelled pinion, u, in gear therewith; this pinion is keyed on the shaft, v, which receives motion from any first mover by a strap passing over the drum, w, which is also keyed upon the shaft, v; x, is a loose drum running freely on the shaft, v, for the purpose of receiving the driving-strap when the machine is required to be stopped; the shaft, v, is supported by the plumber-block, y, bolted to the outside of the frame, a, on the inside of the frame there is a small girder, z, passing from one side of the frame to the other for the purpose of supporting a plumber-block in which the end of the shaft, v, revolves.

It will be observed that the table, b, has only a lower axis, it therefore becomes necessary that the upper part of the table should be guided or supported in some way for this purpose, the vertical outer surface of the ring, b^5, is turned truly, and at three equi-distant parts of the frame, a, there are friction-rollers, B, working in bearings in the frame, a, and coming in contact with the ring, b^5, whereby the table, a, will be guided and enabled to revolve with a quiet and steady motion. In lieu of the three friction-rollers three brass-bearings may be used with proper screws for tightening them up when required; above that part of the revolving-table, b, which forms a shallow annular trough is fixed the hopper, C, which is a circular vessel with an enlarged mouth, across which a bracket, D, is fastened, for the purpose of forming a support or bearing for the vertical-shaft, E, to revolve in. The upper part of this shaft is shown broken off, as its support will be fixed to the ceiling of the house in which it works, the mode of driving it also being dependant on local circumstances is not shown; the lower part of the shaft has arms or blades, F, fixed upon it like a common pug-mill, for the purpose of forcing the sugar downwards. The hopper is open on the under side, the circular form of it being somewhat altered at G, so as to make it fit against the rings, e and f, as closely as possible. One side of the hopper is flattened at the part, C*, where a sliding-door, H, is fitted. On this door there are formed two projections, I, and above them there are two similar projections, J, formed on the flattened part of the hopper; K, K, are screws which work into the

projections, I, at one end, and the other into the projections, J, J, the central part having a capstan-head formed upon it by which they are turned round. When it is required to raise or lower the sliding-door, H, the hopper, C, is firmly retained in its position by a stout bracket, L, through which it passes, the lower part of the bracket being firmly supported by bolts to the frame, *a*, the enlarged part, C^1, at the upper part of the hopper may be continued at the same angle until it rises to the floor above, where a hole may be made equal in size to it, and thus a convenient means will be obtained of putting in large quantities of the matter to be acted on. The upper part of the hopper in that case being also secured to the floor by a flange and bolts. At the back of the hopper and secured to it there is a plough or scraper, N, made of sheet copper with raised edges, the front edge of this plough inclines downwards between the rings, *e* and *f*, and has a nearly sharp edge at N*, where it comes in contact with the wire-gauze surface. The scraper is curved on the side next the hopper and rises up sufficiently high to pass over the ring, *e*, when it again inclines downwards forming a sort of spout, N^1, down which the cured sugar slides into any convenient receptacle placed there to receive it. The whole of the space included between the scraper, N, and the hopper, C, is covered so as not to admit air. In front of the sliding-door, H, and at a small distance from it there is a pipe, P, having a cock, Q, upon it. This pipe is bent over at right angles, pointing in the direction of the centre of the table. The underside of this bent part, which is within a few inches of the wire-gauze surface, is perforated with numerous small holes like a syringe, and from which water or other fluid may be projected on to the table which revolves in the direction indicated by arrows.

When using this machine it is necessary to maintain a partial vacuum in the hollow table, *b*, which may be effected by air-pumps, similar to those used for exhausting vacuum-pans, such pump or pumps being connected with the pipe, *l*, in a manner well understood. There will also be required a common suction-pump for the purpose of drawing off fluid by the pipe, *n*, and discharging it into an elevated cistern from which it may again flow down through the perforated-pipe, P, or be conveyed to a concentrating-pan. Any fluid matters that pass through the wire-gauze surface, *h*, will pass down between the ribs, b^3, and descend the

hollow axis, b^1, of the table, and from it into the space, *m*, from which they are drawn off by the pipe, *n*.

When the air and liquor-pumps are in action and motion is given to the shaft, *v*, and vertical shaft, E, the action of the apparatus will be as follows:—

Crystallized sugar mixed with its mother-liquor is thrown into the hopper, C, and is forced down by the revolving-blades, F, on to the wire-gauze surface, *h*, which will be moving under it at the rate of about eight or ten revolutions per minute. If the sliding-door is lifted up about one quarter or three-eighths of an inch, a coating or stratum of sugar of that thickness will be carried forward on the revolving-table, and as soon as one complete revolution is made the whole of the annular-ring of wire-gauze will be covered with sugar. The exhaustion of the hollow table will now cause the molasses to be drawn into the table, *b*, while the jets of water or solution of sugar under which the thin stratum of sugar passes will be rapidly drawn through it, and carry off the adhering film of molasses; while the sugar is moving round in the direction of the plough, the air will pass through it and carry off the moisture, so that it will arrive there sufficiently dried and be scraped off into a hogshead or other receptacle while fresh portions are being acted upon in a similar manner, and thus the operation is rendered continuous and self-acting. If the revolving-table is four feet in diameter its outer edge will pass through a space of more than twelve feet in each revolution, and if the table makes ten revolutions per minute, the whole time which the sugar occupies from the time it leaves the hopper to the time at which it is removed by the plough from the machine will be less than five seconds, because it requires only about three-fourths of a revolution of the table to produce this effect, and if each complete revolution of the table which is twelve feet in circumference occupies six seconds of time, and the jets of water act upon a breadth of three inches or one-fourth of a foot, it must follow that the time occupied by the sugar in passing under the jets of water will be equal to one-eighth part of a second of time, and when it is considered with what velocity fluids enter a vacuum, it will be fully understood how short a period is allowed in this process for the water to act upon the sugar. The removal of the coating of molasses from the crystals in so small an interval of time, is chiefly owing to the friction against the

crystals of sugar caused by this rapid rush of air and water between them, while the small amount of obstruction to the passage of air or water between the crystals (in consequence of the thinness of the stratum of sugar on the wire-gauze) enables the water to pass between the crystals before it has time to dissolve them. The time which the sugar is under operation may be regulated to any extent necessary by simply altering the speed at which the table revolves, and if a very perfect cleaning of the sugar is desired other jet-pipes for the supply of water or "liquor" similar to the pipe, P, may be made to cross the table at different parts.

In the refining of sugar the great quantity of glucose or molasses generally contained in Muscavado sugar is a source of much inconvenience in the process, I therefore prefer to remove it by this curing-apparatus previous to melting it in the "blow-up" cistern, for which purpose the sugar is first damped or wetted before putting it into the hopper, C, of the curing-machine; I also use this apparatus for treating sugars that have been manufactured abroad and sent into Great Britain in an impure state. For this purpose I prefer sugar made in the vacuum-pan, which when thus deprived of its molasses may be again sent into the market.

Having thus described the nature of my said invention, and the manner in which the same is to be performed, I would have it understood that I do not confine myself to the precise plans here given, so long as the peculiarity of my invention be retained.

But that what I claim as my invention is,

First, constructing the cranks or eccentric-shafts of cane-presses so that the plungers actuated by them are each brought into successive operation, as herein described.

Secondly, I claim the peculiar construction of cane-pressing tubes herein described.

Thirdly, I claim the direct action of the plungers of cane-presses by connecting one end of them to the crank or eccentric-shaft.

Fourthly, I claim the method herein described of guiding and giving a parallel motion to the plungers of cane-presses.

Fifthly, I claim the construction of double-acting cane-presses in the manner herein described.

Sixthly, I claim the use of wrought-iron tension-rods in the construction of cane-presses as herein described.

Seventhly, I claim the mode of constructing "clarifiers" as herein described.

Eighthly, I claim the use of glass in the construction of subsiding-vessels used in the clarification of saccharine fluids.

Ninthly, I claim the forcing of heated air in contact with saccharine fluids taken upon revolving or moving surfaces partly immersed therein.

Tenthly, I claim the evaporation of the aqueous portions of saccharine fluids by the joint action of heating media below 212 degrees Fahrenheit, used in combination with currents of hot or cold air brought in contact with such fluid on the surface of apparatus revolving or moving partly immersed therein.

Eleventhly, I claim the use of a "jacket" or double-bottom to pans as a means of heating saccharine fluids by steam when used in combination with currents of heated air brought in contact with such fluids on the surface of apparatus revolving or moving partly immersed therein.

Twelfthly, I claim the use of a spiral-blade or screw for scraping off or preventing any accumulation of solid matter at the bottom of pans or vessels used in the concentration of saccharine fluids, and also for the purpose of exposing a large surface of fluid in order to facilitate its evaporation.

Thirteenthly, I claim the forcing of air through a central air-pipe or drum in apparatus revolving or moving partly immersed in the fluid to be evaporated.

Fourteenthly, I claim the use of large hollow axes for the purpose of increasing the firmness or rigidity of screws or series of discs used in the concentration of saccharine fluids.

Fifteenthly, I claim the evaporation of the aqueous portions of saccharine fluids by forcing heated air in contact with such fluids or surfaces which move into and out of the fluid to be evaporated.

Sixteenthly, I claim the evaporation of the aqueous portions of saccharine fluids by forcing heated air in contact with thin films or coatings of such fluids on fixed surfaces not heated by any other means.

Seventeenthly, I claim the method of rapidly treating concentrated syrups as herein described.

Eighteenthly, I claim the construction of coolers or crystallizing vessels in the manner herein described.

Nineteenthly, I claim the separation of fluid matter or molasses from crystals of sugar by continuously spreading the same on a table covered with a pervious material, such table being hollow and having a partial vacuum formed therein for the purpose of effecting such separation.—In witness, &c.

HENRY BESSEMER.

Enrolled August 24, 1852.

Specification of the Patent granted to RICHARD DOVER, *of New-street, Spring-gardens, in the City of Westminster, Merchant, for Improvements in Treating Sewage, and in Obtaining Products therefrom, and Combining such Products with other Matters.*—Sealed October 16, 1851.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My said invention consists of a mode or modes of treating sewage with acid or acids, either alone or together, with a salt or salts or other chemical agents for the purpose of deodorizing it and depriving it of its putrescent qualities, and also obtaining certain products therefrom.

The acid which I prefer to use is muriatic acid, otherwise called hydrochloric acid, but any other acid which will have the same effect may be used, although I believe that there is not any other acid which can be used so economically for this purpose as the muriatic acid.

The chemical salts or other chemical agents which I prefer to use in conjunction with an acid are chloride of sodium and protosulphate of iron, more particularly because I believe those salts can be used more economically than any others; but in lieu of chloride of sodium chloride of potassium, chloride of magnesium, chloride of calcium, or any other chloride which can be had at a price sufficiently low may be used.

In lieu of the protosulphate of iron, the sulphate of the peroxide of iron (if it can be obtained sufficiently cheaply) or any other sufficiently cheap metallic salt, the base of

which is capable of being precipitated or separated from its acid by the chemical action of the sewage matters may be used.

And in addition to the salts I have mentioned I prefer to add a portion of proto-chloride of iron, otherwise called muriatic of iron, to the acid which I apply to sewage matter for the purpose of more effectually deodorizing it and depriving it of its putrescent qualities, or the same effect may be obtained by adding a small portion of oxide of iron to any muriatic acid which may be intended to be used.

The action of the acid and other chemical agents may be effected in any suitable vessel containing the sewage, after which I separate the liquid from the solid matters by subsidence and by filtration through any suitable filtering material.

The filtering material may be either charcoal or any other material or materials which will separate the liquid from the solid parts of the sewage. By employing as a filtering medium, charcoal, gypsum, or other materials capable of absorbing and retaining some of the matters held in solution or mixed with the sewage liquid, the filtering materials may thus be impregnated or combined with matters which may make them available as manure to fertilize land.

In the drawing hereunto annexed I have shown a figure of an apparatus which may be used for the purpose of carrying into effect my invention, but I do not intend to claim such apparatus as any part of my invention. This figure shows a vertical section of the apparatus.

A, is a layer of charcoal; B, is a layer of clay pulverized; C, is a layer of gypsum ground; D, is a layer of peat pulverized; E, F, and G, strainers over mouth of tubes or conduits of supernatant water.

There is a tap at E, (not shown by the sketch,) in connexion with a float so as to prevent the escape of the matters from the reservoir of sewage until that vessel is full; then by the rising of the float the passage will be opened to the first filter.

The quantity of hydro-chloric acid which I use for the purpose of my invention is about five pounds and a-half, of the usual strength, for every ton of ordinary liquid sewage matter, and when I do not use that acid I employ an equivalent quantity of some other mineral acid.

If I design to use proto-chloride or muriate of iron (which I generally prefer to do) I either use about a pound of that material in lieu of a similar weight of the acid or in cases in which I employ hydro-chloric acid, I mix the acid with iron filings or oxide of iron in the proportion of about half a pound of the iron filings or oxide with every five pounds and a-half of acid, some hours before the mixture is used, stirring the whole frequently to promote the solution of the iron.

The quantity of chloride of sodium which I use is about three ounces to every ton of liquid sewage, and of proto-sulphate of iron about six ounces to every ton of liquid sewage.

I dissolve the salts in a quantity of water sufficient for that purpose and then mix them with the acid, and I add the requisite quantity of this mixture to the liquid sewage in a vessel gradually as the vessel is filled with the sewage, the flow of the sewage into the vessel being sufficient to cause the whole to be mixed with the requisite proportion of the mixture which I use.

If the chloride of potassium, magnesium, or any other similar chloride be used, the quantity of it must be about the same as that of the chloride of sodium already mentioned.

And if any other metallic salt be used in lieu of proto-sulphate of iron, the quantity used should be about the same as that of the proto-sulphate of iron.

The solid sewage matters obtained by filtration may either alone or in combination with other matters be used as a manure, but I prefer to mix such solid sewage with the filtering material by which it has been separated from the fluid sewage, and which shall have been impregnated in the manner I have already mentioned, and this combination of materials will I believe produce a manure possessing important fertilizing power.

The solid products or sewage obtained by filtration in the manner already described may be combined or mixed with any other matters so as to form other useful compound manures for fertilizing land.

Thus the solid sewage may be mixed with refuse animal matters, shale, marl, or any other material having the requisite fertilizing powers, so that the combination shall possess the desired properties according to the nature or

quality of the soil or soils to be fertilized or the crops or plants to be produced.

Instead of using the solid matters of sewage as manure they may, if preferred, be subjected to any chemical process or processes for the purpose of obtaining any chemical or other products therefrom.

The filtered sewage liquid may also be subjected to any process or processes for the purpose of obtaining ammoniacal salts or other products therefrom, or such liquid may be used as a manure for fertilizing land.—In witness, &c.

RICHARD DOVER.

Enrolled April 16, 1852.

Specification of the Patent granted to LOUIS VICTOR RUZÉ, *for Certain Improvements in the Manufacture of Hat-Plush and similar Silk Cloths.*—Sealed May 22, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists of causing hat-plush and similar silk cloths to be passed through and to be acted on by a machine arranged with teazles or cards on a cylinder which lay the pile evenly, the fabrics being prepared and acted on as herein described.

Description of the Drawing.

Fig. 1, is an end view of a machine constructed suitably for carrying out my invention.

Fig. 2, is a section thereof.

Figs. 3 and 4, show respectively a frame of teazles and the steaming-box separately. A, is the framing, the nature of which is clearly shown in the drawing; *b*, is the main or driving-shaft, which receives motion by a strap acting on the drum, *c*, from a steam-engine or other frame. On the axis, *b*, is fixed the cog-wheel, *d*, which takes into and drives the cog-wheel, *e*, on the axis, *f*, of the cylinder, on which are fixed frames of teazles or cards, as is well understood, and as shown at *h*, *h*, and this cylinder revolves

at the rate of about 160 revolutions per minute. The cog-wheel, *d*, also takes into and drives the cog-wheel, *i*, on the axis of the roller, *j*. The cog-wheel, *i*, gives motion to the cog-wheel, *n*, on the axis of the roller, *p*, by means of an intermediate cog-wheel, *l*, on the axis, *m*. On the other end of the axis of the roller, *p*, there is fixed a cog-wheel, *q*, which gives motion to the cog-wheel, *r*, on the axis of the roller, *s*, as indicated in the drawing by red circles. *k*, *k*, *k*, are three rollers which regulate the manner in which the fabric is brought to be acted on by the teazles or cards; the upper rollers, *k*, are carried by arms, k^1, projecting from frames, k^2, moving on the axis, *f*, which frames have cogged-racks formed thereon, into which the cog-wheels, k^3, fixed on the axis, moved by the handle, k^4, by means of which the arms carrying the upper rollers can be raised or lowered, and thus regulate the manner in which the plush or fabric comes into contact with the teazles or cards; *t*, is a rotating-brush which cleanses the teazles or cards, it receives motion by a band, *x*, on the pulleys, *u*, *v*. The ends of plush fabric, *z*, to be operated on are sewn or fastened together and made into an endless band and placed in the curved holder, *y*, as shown; it passes outside the lower roller, *k*, then between the upper rollers, *k*, then over the cylinder to be acted by the teazles or cards, then over the steam-box, *a*, supplied with high-pressure steam by the pipe, a^1, which passes through holes in the box; thence the fabric passes over the roller, *j*, then between the rollers, *p* and *s*, as shown, the rollers moving in the direction of the arrows. The plush or other like silk fabric is, previous to being operated upon as above described, subjected to an acid bath for about a quarter of an hour, composed by preference of 500 parts by weight of water to one of sulphuric acid heated up to a mild temperature. The fabric is then removed from the bath and the moisture separated by a hydro-extracter or other means, or in place of sulphuric other acid may be used.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details herein given, as the same may be varied, so long as plush or such like silk fabrics are subjected to the treatment herein described, and the steam-box with holes, and the machinery for giving motion to the fabric and to the cylinder

carrying the cards or teazles, may be varied without departing from my invention.—In witness, &c.

LOUIS VICTOR RUSE.

Enrolled November 22, 1852.

Specification of the Patent granted to WILLIAM HENRY PHILLIPS, *of No.* 3, *Grosvenor-place, Camberwell New-road, in the County of Surrey, Engineer, for Improvements in Decorative Illumination, and in Applying Light for other Purposes.*—Sealed June 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists in the use of chambers and tubes made to receive coal-gas or inflammable vapour, the chambers or tubes being arranged in a manner that decorative illuminations are produced by jets of burning gas or vapour without the necessity of bending-pipes, and brazing them together into the form of a device, as now practised in gas-illuminations.

And in means of changing the appearance of an illumination from one device to other devices.

Fig. 1, is a front elevation of a chamber made to receive gas or inflammable vapour.

Fig. 2, is a vertical section of the same.

Fig. 3, is a horizontal section of the same.

A and B, are plates of metal forming a narrow close chamber, the front plate, A, being perforated with any appropriate choice; C, C, are gas-surface pipes.

Fig. 4, is a front elevation of a chamber made to receive gas.

Fig. 5, is a vertical section of the same.

Fig. 6, is a horizontal section.

In addition to the gas-chamber formed by the plates, D and E, this apparatus has a sliding-plate, F, which is made to move by using the winch-screw, G, or by other suitable leverage, whereby a number of perforations forming a device on the surface of plate, D, are brought to open into corresponding perforations in the plate, F; by turning the winch, G, the plate, F, is moved in order to shut off one

device, and the perforations of a different device, and so on with any convenient number of devices.

The gas-chamber, D, E, is made narrow, being enlarged at E*, fig. 6, to inclose the supply-pipe, H; the sliding-plate, F, is here shown detached from its place.

The supply-pipe, H, is closed at H*, and is perforated, as shown at fig. 5, to allow the gas to be diffused into the chamber, D, E.

Fig. 7, is a front elevation of apparatus formed of tubes or pipes.

Fig. 8, a vertical section of the same.

J and K, are frame-pipes supplied with gas from the pipes, M and N; O, a stop-cock for opening and closing the gas-ways between the service-pipe, P, and the pipes, M and N; Q, Q, connecting-rods; R, R, R, a set of pipes equidistant from each other, being stopped off at the upper end and open at the lower ends, where they enter into the pipe, J; these pipes, R, R, R, are perforated with a device shown at R, R, R, fig. 7; S, S, S, set of pipes equidistant from each other, being stopped at the lower end and open at the upper end, where they enter into the pipe, K; these pipes, S, S, S, are perforated, as shown at S, S, S, fig. 7.

The chamber formed by the plates, A, B, figs. 1, 2, 3, is supplied with gas or inflammable vapour from a gas-main or suitable generator, and when the air has been driven out of the chamber the gas issuing from the jets in the front of plate, A, being lighted forms a decorative illumination. The chamber formed by the plates, D and E, figs. 4, 5, 6, is supplied with gas, and by the use of the winch, G, the perforations forming a device in the plate, F, are brought into juxta-position with corresponding perforations in the plate, D, when the jets of gas issuing from the open perforations are lighted and form an illuminating device. When a different device is to be displayed, the plate, F, is moved by means of the winch-screw, G, until perforations of the required device in plate, F, correspond with similar perforations in the plate, D, and so on for other devices.

In the apparatus, fig. 7, the gas issuing from the perforations of one set of pipes being lighted, an illuminative device appears, which device is made to disappear by turning off the supply of gas by means of a tap or taps, and a different illuminated device appears by opening the supply to another set of pipes.

I do not confine myself to any particular form of gas-chamber, nor to any particular plan of opening or closing the jets or gas-ways, a principle of my invention being the producing decorative illuminations by jets of light without bending-pipes into the form of the device, as hitherto practical in gas-illuminations and means of changing the devices during the time of illuminations.—In witness, &c.

WILLIAM HENRY PHILLIPS.

Enrolled December 1, 1852.

Specification of the Patent granted to JOHN HARCOURT BROWN, *of Aberdeen, Scotland, and* JOHN MACINTOSH, *of the same place, for Improvements in the Manufacture of Paper and Articles of Paper.*—Sealed May 22, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—Our invention consists of constructing and applying hollow frames or moulds with permeable surfaces, within which frames or moulds a partial vacuum may be obtained when the same have been immersed in pulp, by which means paper will be formed on such parts of the surfaces as are uncovered or permeable. And in order that our invention may be most fully understood, and readily carried into effect, we will proceed to describe the means pursued by us. We construct hollow moulds or frames, which we prefer to be of perforated metal (though other materials may be used), giving interior support or strength to prevent the pressure from putting the same out of shape; and on the outside of such surfaces, and to facilitate the removal of the paper, we apply felt or woollen cloth or other fabric to cover those parts whereon paper is to be made, the other parts being originally made or rendered impermeable, whereby the pulp will only form paper over the permeable part or parts of the surfaces; hence, according to the forms or shapes of paper or articles of paper desired to be made, so will be the constructions or forms of the moulds or frames employed.

Description of the Drawings.

Fig. 1, shows a conical form or mould suitable for making paper in a conical shape.

Fig. 2, is a flat frame or mould suitable for making flat bags of paper.

Fig. 3, shows a similar frame or mould to that at fig. 2, but suitably arranged for making seamless or joinless envelopes.

These three frames are all similarly constructed, they differing simply in regard to their shape; but from these forms others may be arranged and made by a workman suitable for producing paper differing in shape from those which will be made on the moulds or frames shown at figs. 1, 2, and 3. Each of the frames or moulds shown in the drawing is made of thin perforated metal, strengthened within by a frame, as shown by the drawing; and each has its covering of felt or woollen cloth, or other fabric, which being drawn on is retained securely thereon in a condition to be used. And we believe that the best means of securing the cover of felt or cloth thereon is by a band of vulcanized india-rubber, *a*, fixed on one end of the mould or frame, which will readily roll back when drawing on the cover of felt or cloth or other fabric, but which, when released, will fold again over the frame or mould, and secure the end of the cover. Each of the frames, figs. 1, 2, and 3, is provided with a tube, *b*, by which it can be attached to a pipe in connexion with any suitable apparatus for obtaining a partial vacuum. Any convenient number of either of such frames or moulds may be fixed to the same pipe, and such pipe may be connected to any suitable apparatus for lowering such frames or moulds into and raising them out of vats containing pulp. And it will readily be understood, if one or more of either of such frames or moulds be lowered into or immersed in pulp, and a partial vacuum be then obtained therein, that paper will be formed on the permeable parts exposed; and if the mould or moulds be like that shown at fig. 1, one or more conical bags of paper will be produced. On withdrawing the apparatus from the pulp, and moving back the india-rubber, the felt or cloth or other fabric covering of each mould will be readily drawn off with the paper thereon, when the moulds or frames may be again covered with other felts or cloths or fabrics, and be again used, whilst those covers with paper thereon may be pressed,

and the paper thereon covered by being passed between rollers covered with felt; and when dried, the paper formed on such covers may be taken off, or the pulp may be taken off before dry. By these means may bags and such like articles of paper be made; but, in case it be desired that they should be pressed, they are to be subjected to pressure as other articles have heretofore been pressed.

From the above description, aided by the drawings, a workman will readily understand the nature of the invention when making hollow articles of paper, and he will readily perceive that cylinders of paper, each being closed or not with a circular end, may be made by using frames or moulds suitably formed therefor. And it should be stated that it is not essential that the paper should be made exterior on the mould or frame, for it will readily be understood that if the conical mould, fig. 1, or the mould, fig. 2, be inverted and made close on the outside, and have a perforated or permeable mould or frame on the interior, with a space between the interior mould or frame and the exterior, then on the frame or mould being introduced into or submerged in pulp, on a partial vacuum being procured, a like result would be obtained. A workman will, therefore, in carrying out our improvements, resort to an external or internal mould, according as the one or other may be most suitable for the particular article of paper he is desirous of making according to our invention; and for some articles he may combine the use of internal and external permeable surfaces where the form of article requires it. Our invention is not, however, confined to the constructing paper or articles of paper in hollow forms, as pieces of paper may be made flat, and of various forms, thus:—

Fig. 4, shows a flat hollow mould or frame, which may be used in making various articles according to the screen used therewith. In fig. 4, the moulding frame shown is suitable for making a piece of paper on either side, and the drawing shows a different screen on either side; and these screens are only given as examples, in order that a workman may better understand the variety of form which may be produced. In using this mould with or without a felt or cloth or other fabric laid over it, under each screen, only that portion of the frame or mould on either side which is exposed by the opening through the screen will be permeable; and consequently, when the frame or mould is submerged in pulp, and a partial vacuum obtained, that part

only on either side will have paper produced thereon, and a mechanic will readily understand from this how to construct frames or moulds and screens for making other forms of paper. And it is desirable that we should remark, that in making paper and articles of paper according to our invention, in cases where it is desired, the paper may on one side be of one colour, and on the other side another colour; or parts of the surface may show different colours to other parts of the surface, and these differences of colour are obtained in the following manner:—Supposing a frame or mould has been dipped in pulp, and a partial vacuum obtained, so as to produce a film of paper thereon, if the mould or frame and paper thereon be then dipped into another vat of pulp of a different colour, and a partial vacuum be again obtained therein, the surface will be coated with paper of such other coloured pulp; but if it be desired that only part of the surface or surfaces should be of a different colour, then, by covering up part or parts of the surface or surfaces by suitable screens, letters or devices may be produced; and further, if desired, lace or other fabric may be placed on the surface or surfaces of paper produced on a mould or frame, and then covered by the second coating of paper, and thus be confined between them. We would, however, remark that we are aware that double paper has before been made with lace or fabrics between them. We do not, therefore, claim the same when the double paper is not made according to our invention, by using moulds or frames within which a partial vacuum is obtained when producing paper thereon.

Having thus described the nature of our invention, and the manner in which we perform the same, we would remark that we do not confine ourselves to the details herein described, as they may be greatly varied, and yet retain the peculiar character of our invention.

But what we claim is, the mode herein described of manufacturing paper and articles of paper, whereby hollow moulds or frames with permeable surfaces are employed, and within which moulds or frames a partial vacuum is obtained when making paper and articles of paper.—In witness, &c.

JOHN HARCOURT BROWN.
JOHN MACINTOSH.

Enrolled November 22, 1852.

Specification of the Patent granted to WILLIAM REID, *of University-street, Electric Telegraph Engineer, and* THOMAS WATKINS BENJAMIN BRETT, *of Hanover-square, Gentleman, for Improvements in Electric Telegraphs.*— Sealed June 12, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— Our invention relates to the preservation and protection from injury of the wires used for transmitting electricity for electro-telegraphic purposes.

Our improvements in the means for effecting this object consist,

First, in enclosing the wires (which have previously received a coating or coatings of insulating material or materials) in pipes of wrought or cast-iron, wood, slate, or earthenware, of the peculiar forms and constructions hereinafter fully described, the principal characteristic of such pipes being that they are composed of a trough-like portion or body, and a cap or cover which fits upon the same.

Secondly, our improvements consist in inclosing the wires, or those portions of the wires which are intended to traverse a river or other body of water, in what we propose to call a vertebral chain, consisting of a series of short hollow portions of iron united together in a manner somewhat similar to that of the several portions of the vertebra or back-bone, and so as to leave a free passage throughout for the reception of the insulated wire or wires, while at the same time the whole is flexible, and the several portions are capable of turning freely.

We will now proceed to describe the drawings accompanying this specification.

Fig. 1, is an end view; and

Fig. 2, a plan view of an iron pipe constructed according to the first part of our invention. It consists of a body or trough, *a*, over which a cover, *b*, is fitted. In using this pipe for receiving insulated wires beneath the surface of the earth, a trench is formed, on the bottom of which the body or trough, *a*, is laid; the wires, properly insulated by any of the well-known means, are then laid therein; the cover is placed over the mouth of the body or trough, and the trench is then filled with earth. The adjacent lengths of pipe may, if preferred, be connected together by the clamp

or stirrup-shaped fastening shown in side elevation at fig. 3, and in plan view at fig. 3**; in applying which, it is first passed over the end of the length of pipe which has just been laid down and covered; and after the next length of pipe has been laid down, with one end in contact with the end of the first-named length of pipe, the clamp is slidden partly over it, and fixed by driving in a wedge between the bottom of the pipes and the part, *c*, of the clamp. Clamps may be also placed between those at the joints, if the length of the pieces of pipe or other circumstances render the same advisable. In general, however, the clamps will be only used at those places where there are joint bores, as hereinafter described.

Figs. 1*, 2*, and 3*, exhibit our method of uniting the lengths of pipe together by means of socket-joints.

Fig. 4, is an end view; and

Fig. 5, a plan view of another iron pipe, the body of which is similar to that shown at *a*, figs. 1 and 2, but a channel or recess is formed in the upper edge thereof, at each side; and a flat lid or cover is dropped into the bed thus made for it.

Figs. 6 and 7, represent end and plan views of a wooden pipe or trough, the body of which is produced by taking a piece of wood of a rectangular figure in its transverse section, and making two saw cuts therein, lengthwise, in such manner as to remove a portion of the wood, and leave a V-shaped groove to receive the wires. From the portion thus removed, a slice is cut off to form the lid shown at *d*, in fig. 6. The dotted lines in fig. 6 indicate the form in which a pipe with a V-shaped groove might be advantageously made in cast-iron.

Fig. 8, is the section of another cast-iron pipe formed with a V-shaped groove therein.

Fig. 9, is a plan view of the same.

Fig. 10, a transverse section of a pipe, the body of which is made with a channel or recess in the upper edge, at each side; but such recesses, in place of being formed along the inner side of such upper edge, as in figs. 4 and 5, are in the outside.

Fig. 11, is a plan view; and

Fig. 12, a transverse section of another form of iron pipe, the body and portion of which is cast with two flanges, *e*, *e*, with small holes, *e**, therein, at each end of the length of pipe, or at the middle of such length; and the lid, *f*, is of such size as to extend to the edge of such flanges, and is

cast with short pins in the under side thereof, to fit into the holes, the principal object in employing these steady pins being to retain the lid in its place whilst the earth is being rammed into the trench upon the pipe.

Fig. 13, is a plan view.

Fig. 14, a longitudinal section; and

Fig. 15, a transverse section of a pipe, which is nearly cylindrical, having the upper side open, and formed with raised edges at each side of the opening, over which a cap or cover, *g*, is fitted.

Fig. 16, is a transverse section of a cylindrical pipe, having an opening in it from end to end, to receive a long cover or plug, *h*. The pipe may be made of iron by rolling in the manner of making gas-pipes, but without welding the edges together; or it may be made of earthenware. In the former case, the cover or plug, *h*, may be made of wood or iron; and in the latter, it should be made of wood. These pipes may be connected by means of sockets or ferrules, or in any other convenient manner.

Fig. 17, represents the section of a curved portion of pipe to be used for carrying the line of wires round corners, &c.

Fig. 18, is a section of a short curved pipe, which may be used for altering the line of direction of the wires.

Fig. 19, is an elevation thereof; and

Fig. 20, is a plan view of the cover for the same.

Fig. 21, exhibits a cross piece, to be used for lines of wire converging to each other, and meeting at one point.

Fig. 22, is a T piece, to be employed when branch wires are required, to leave the main line for a station or instrument.

Fig. 23, is a longitudinal section of the joint-box, where the alternate lengths of wires terminate, and are united to the succeeding lengths of wires.

Fig. 24, is a transverse section.

Fig. 25, is a partial plan view, showing the mode of fastening on the cover; and

Fig. 26, is a plan view of a joint-box, with its cover and fastening keys complete. We propose to use an iron box, with a lid hinged thereto, as a testing box for the wires, and to let such box into the road-way or pavement, and flush with the surface thereof; so that, by unlocking or unfastening the lid, the covers can be readily got at.

Fig. 27, is an external elevation; and

Fig. 28, a longitudinal section of two links of a vertebral

chain constructed according to the second part of our invention. Each of the links is cast in two halves, with holes, *i*, *i*, therein, to receive pins or rivets, whereby the two parts are connected together, when the two halves of the neck, *j*, of the next link have been inserted in the hollows or recesses, *k*, *k*, of such first-named halves. By this mode of connexion the several links composing the whole vertebral chain will be securely fastened together, and form a strong continuous flexible casing for the insulated wires, which are inserted in the interior of the chain.

Although in the above description we have stated that certain pipes were made of iron and wood, we reserve to ourselves the right to make pipes for the purposes of our invention of wrought or cast-iron, wood, slate, or earthenware, as circumstances may render most advisable; the principal feature of the first part of our invention being the construction of pipes or troughs with lids, which do not necessarily require any fastening, so that the trouble and expense of bolting or otherwise affixing them together is thereby saved; and this plan also admits of the introduction of the wires into the pipes or troughs, without the liability to straining and injury, to which they are exposed when being introduced or drawn into the ordinary perfect or whole circular pipes, as heretofore practised.—In witness, &c.

W. Reid.
T. W. B. Brett.

Enrolled December 12, 1852.

Specification of the Patent granted to William Wood, *of Pontefract, in the County of York, Carpet Manufacturer, for Improvements in the Manufacture of Carpets and other Fabrics, and in the Apparatus or Machinery connected therewith.*—Sealed May 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention relates,

Firstly, to that description of looms in the manufacture of terry weaving, where the wires used to form the terry are each fixed at one end to a lever or other suitable carrier, in order, by the working of the loom, to insert a wire when the

pile shed is opened, and to cause such wire to come forward slightly to the shed when the beat up takes place. Heretofore it has been proposed, in the specification of a former patent, to work looms with such descriptions of apparatus by the use of only two wires on this side of the loom.

Now this part of my present improvements consists in applying in the working of such looms an additional wire or wires. It will not be needful to show by drawings any mode of affixing and controlling such wires, as the additional wire on either or both sides will be carried by the same lever or other carrier which carries the one wire, care being observed that the point of each wire be directed to enter into and pass through the shed opened for it; and such two wires on either or both sides of the loom will be actuated in like manner to where one wire only has heretofore been proposed.

Such adaptation of two wires to either or both sides of the loom will be found particularly applicable to the making of carpets or other fabrics with a pile on both sides, in doing which it will only be needful to arrange the different pile warps, so that when the two wires have to be introduced, there shall be two pile sheds, one on each side of the main or body warp, and the operations of the loom will otherwise be very similar to where only one wire is used, as will readily be understood by persons acquainted with the working of looms.

Another mode of employing such additional wires will be in the manufacture of terry fabrics with pile only on one side, but with part of the pile cut as velvet pile. For this purpose, pile warps are to be arranged in two sets, selected by jacquard or otherwise, if the different kinds of piles be required to be in pattern, and such pile will be opened so as to form two distinct sheds, one for each of the two wires carried by their particular carrier, and they are to be caused to enter simultaneously into their separate sheds. It will be understood that, when opening the pile warps to form two distinct sheds, one of the wires on each side at each insertion will be only partially covered, while the other will be covered by both sets of pile warps; and in order to make cut or velvet pile of one set of loops at each insertion of wire, I form one wire on each side of the loom, that one which in working is only partially covered with a knife edge at or near one of its ends, so that in the act of withdrawing it may cut itself out.

Secondly, my invention relates to the application of weft-stopping motion to looms for weaving pile fabrics, when pile is obtained by the use of wires, which are, during the working of the loom, fixed to levers or other carriers, and which, after they insert the wire in the shed, continue with it during its being bound in the fabrics to form a row of loops, and are the means, or partly the means, of withdrawing the wire. Hitherto, in working looms with such descriptions of apparatus applied by means of using a weft stopping motion have not, to the best of my belief, been found practicable, owing to the difficulty of arranging it, so as not to interfere with the working of the wires.

Fig. 1, shows a section; and

Fig. 2, a front view of parts of a loom, sufficient to enable me to describe my arrangement of weft-stop motion as adapted to a loom having this particular kind of apparatus applied thereto. *a*, *a*, are fusees, which move in notches or recesses formed in the shuttle race, so that the upper surface of these fingers may not, in the ordinary working of the loom, project above to interfere with the passage of the shuttle. These fingers in part support the weft-thread, and they have projections, *b*, which are so placed that in the movement of the latter towards the front of the loom to effect a beat up, they may be acted upon by the weft-thread just thrown in, and which is borne forwards against such projection, *b*, by reads or counter-fingers, *h*, so carried by the batten; and if weft-thread be not thrown in, either from breakage or otherwise, these proportions will not be acted upon, and the parts will be retained in position to stop the loom. This is accomplished in the following manner:—one end of the fingers, *a*, is attached to the arm, *c*, projecting up from the shaft, *d*, which extends across, and is supported by the front of the loom, so as to have one of such arms, *c*, on each side in connexion with fingers, *a*, and projections, *b*, at each selvedge. Upon this shaft, *d*, is also affixed another arm, *c*, the point, e^1, of which is so placed that when weft is thrown across correctly, and acts upon the projection, *b*, those projections and upper end of the arm, *c*, will be moved forward, causing the depression of the point, e^1, of the arm, *e*, which will depress the end, f^1, of the lever, *f*, so that the other end of the lever, *f*, may be out of the way of the projection, *g*, carried by the batten; but if the weft be not thrown across, the projection, *b*, will not be acted upon, the arms, *c* and *e*, will remain in the position shown, as will also

the lever, *f*, and the coming forward of the batten will cause the projection, *g*, to come against the end, f^2, of the lever, *f*, which is in position to act upon the spring handle, to throw it out of its notch, and so move the strap off the fixed on to the loose drum, and thus stop the loose loom; b^1, b^2, are guides carried by the fingers, *a*, to guide the end of the wires used in fixed wire looms, and to prevent such wires being interfered with by the parts, *b*; *i*, i^1, are springs to bring the arms, *c*, *c*, into position for the ordinary working of the looms.

Thirdly, my invention consists in the application of a weft-stopping motion on each side of looms worked by power to produce cut or uncut pile fabrics, when the pile is obtained by the insertion of pile wires, over which the pile warp is laid in the act of working.

In weaving terry fabrics by power, it is very important to have the capability of an immediate stoppage of the loom, in case of weft breaking, or otherwise the weft fails; and I am aware that it has been proposed to apply a weft-stopping motion on one side of such looms, but it is found that the loom does not stop with sufficient quickness, and a fresh wire gets thrown in before the previous one is properly bound in, and the motion of the looms has to be reversed, which causes loss of time and defective work; and I have found that, by applying a weft-stop motion to each side of such loom, this defect is to a great extent avoided, and thus a considerable advantage in working is obtained; and it is the application of a weft-stop motion at each selvedge of the fabric or side of such loom which constitutes the novelty of the third head of the invention. The adaptation of a weft-stop motion to looms being so well understood, I have not thought it needful to show a drawing of the same, and a workman acquainted with looms will readily apply such motion to both sides of the same.

The fourth part of my invention consists in weaving terry loops on the back or under side of carpets and other fabrics, when such loops are made of yarns or threads produced wholly or in part from linen, tow, cotton, or silk, or wool waste. I am aware that it has been previously proposed to weave terry loops on the back of piled fabrics with the same yarns or warps which is used for the front, and this has been done with a view to turning over one side when the other has become worn. The object of this part of my invention is not to make fabrics with a view to turn over one side

when the other is worn or otherwise injured, but with a view to give substance and elasticity to the back of this class of fabrics by weaving terry loops or pile at the back; and to produce this effect at a cheap rate, I make such loops of yarns made wholly or in part from linen, tow, jute, cotton, or silk, or wool waste. A convenient means of forming such loops is by the use of the improvements just described, that is, by having two wires on each side of the loom.

Having thus described the nature of my said invention, and the manner of carrying the same into effect, I would have it understood that what I claim is,

First, the application to looms for weaving piled fabrics of two wires moved by the same instrument or carrier.

Secondly, I claim the apparatus of a weft-stopping motion to looms where wires are fixed to carriers or instruments.

Thirdly, I claim the application of weft-stopping motion to both sides of looms for weaving pile fabrics by wires.

Fourthly, I claim the weaving of carpets and other fabrics with a pile on the under side of different materials from that which is employed from the face pile.—In witness, &c.

William Wood.

Enrolled November 1, 1852.

Specification of the Patent granted to Samuel Cunliffe Lister, *of Manningham, in the County of York, Machine Wool-Comber, for Improvements in Treating and Preparing before being Spun, Wool, Cotton, and other Fibrous Materials.*—Sealed May 22, 1852.

To all to whom these presents shall come, &c., &c.—Since the patent taken by Mr. Donisthorpe and myself in 1851, in which several forms of combing-machines drawing out detached portions of fibrous material are described, I now find that wool and other fibrous material can be combed with great advantage by having the fallers of the gill much narrower than have been used, say about one-eighth of an inch broad, but not to exceed one-fourth of an inch, as by making the fallers narrower, I am enabled to operate upon a smaller quantity of fibrous material at a time, and thus to make less noil and better work. When the faller is very narrow, the "taking-comb" recently

patented by me will be found to work with greater advantage than the nipper. Until recently the combing of cotton has not been considered practicable; it is now, however, combed with great success upon two machines, Heilman's, and Lister and Donisthorpe's; in one of these machines it is combed in detached pieces, first at one end and then at the other, and in the other machine it is drawn out in detached quantities by a comb or nipper, and then placed upon another comb to be drawn off. Now, I have discovered that it can be combed with great facility if lashed or filled on to fine combs, without being first drawn out in detached quantities by any suitable feeding-apparatus, provided the combs are sufficiently fine, say not less than ten teeth in each lineal inch, but I prefer from thirty to fifty; and the chamber of the comb should not exceed half an inch, but I prefer one-sixteenth of an inch wide, and I also prefer that the form of the comb should be circular or endless.

But I would remark that all the various plans now used for combing wool may be modified so as to comb cotton, provided the combs on to which it is filled are made sufficiently fine. But in order that the cotton should be filled on to fine combs with advantage, in the manner above described, it should be first well opened out and straightened by being prepared upon porcupine drums, or other suitable pointed surfaces, having feed-rollers of small diameter, say not exceeding one inch, and the number of teeth per square inch should not be less than ten, but I prefer about thirty; in order to be properly prepared it should be passed through several machines, each having the pointed surfaces finer than the other; screw-gills and porcupine-rollers will be found to act with great advantage in producing a regular and even sliver ready for being filled on to combs, also after being combed; but generally speaking, I find to card it upon a suitable carding-engine is the cheapest and most advantageous plan when filled on to fine combs, as described. It is also desirable that the combs should be heated when combing cotton. After being filled on to combs good work may be produced by simply drawing it off without working it, but I prefer to comb it with fine combs, having not less than twenty teeth per inch. A card or porcupine surface may be made to lash or work it after being filled on to suitable combs. In using combs for combing wool I find it a great advantage to have the front rows

placed nearer together than is usual, say not to exceed after the rate of three rows in three-sixteenths of an inch, but I prefer them in two-sixteenths of an inch, especially when filled in detached quantities. I also find that when botany, Saxony, and similar fine wool capable of being spun to 40*s.*, are filled on by a lashing process, that much finer combs may be used, especially when such wools have been carded, say, not less than fifteen teeth per lineal inch. —In witness, &c.

SAMUEL CUNLIFFE LISTER.

Enrolled November 22, 1852.

Specification of the Patent granted to HENRY ADCOCK, *of Northumberland-street, Strand, in the County of Middlesex, Civil Engineer, for Improvements in the Manufacture of Pipes, Chimney-Pots, and Hollow Vessels; also Bricks, Tiles, Copings, Columns, and other Articles used in Building Houses and other Structures.*—Sealed October 3, 1851.

To all to whom these presents shall come, &c., &c.—My invention consists in melting the mineral, rock, or stony substance, known commonly as basaltes, trap, rowley-rag, or whinstone; or minerals of such like structure and belonging to the same geological genus, and running the same in a fluid state into moulds suitably formed for producing coatings of the shapes and forms desired.

I put the material, above-named, into a reverberatory furnace, or other furnace suitable for the purpose, in which high degrees of heat may be obtained, and melt it, either on the bed or bottom of the furnace, or in crucibles. I then, by tapping the furnace, or by pouring it from the crucibles, cast the liquid material into moulds of the required shape, as is usual in the casting of iron, brass, or other metals. I give preference, however, to moulds made of cast-iron, constructed of a sufficient number of parts, in the ordinary manner of such contrivances, as will admit of the removal of the cast material; and the several parts, when put together, or built up to form the mould, are held together by clamps or otherwise. When I employ a cast-iron mould, I sometimes brush over its external and internal surfaces,

prior to heating the same in an oven, or to casting into that mixture of finely powdered charcoal and water, termed by iron-founders "blacking." But it should be stated that in most cases, and more particularly when it is intended that the cast material shall have polished surfaces (in the production of which the surfaces of the cast-iron mould, which gives the impression, are planed, bored, smoothed, and polished), I brush over the external and internal surfaces of the mould a mixture of black-lead and water; and afterwards polish the internal surfaces of the mould, or those parts which give the impression, with dry black-lead. In casting polished surfaces, and in coating generally, I find it advantageous to heat the mould, and the core within it, previously to a bright red, or even beyond it, in an oven; and to pour the liquid material into it while thus heated. I have found that on the rate of cooling will greatly depend the character of the material. If cast in moulds sufficiently heated to allow it to retain its fluidity or when heated in an oven in the mould, after it is cast, and there brought to a liquid state, and in either case afterwards allowed to cool with a very gradual slow rate of cooling, cast material will be a hard, strong, stony substance, assimilating closely in its fracture, and appearance, to the original material of which it is formed. A less degree of heat, with a less slow rate of cooling, will give to the cast material a marble like appearance. And a more rapid rate of cooling will leave the cast material of an opaque glassy structure, unless it be cast very thin, when it will be found to be transparent or semi-transparent.

I find it convenient, therefore, to build an oven at a lower level than the reverberatory or other furnace, and so beside it, that I can cast from such furnace into the mould, while remaining in such oven; and afterwards apply such degrees of heat as may be required to maintain the mould and the cast material within it so as to ensure the material being in a melted state in the moulds; and I then allow the mould and the material within it to cool slowly. In making pipes, chimney-pots, and hollow vessels of a common kind, I can employ sand and loam cores, such as are employed by iron-founders. When casting barrels, cylinders, pipes, and the like, which require internally a smooth surface, I employ cast-iron cores; and in order to admit of their being withdrawn from the interior of the cast material easily, each cast-iron core is made in parts; such parts, by plan-

ing and fitting, are to be accurately adjusted to one another, and made smooth; and such cast-iron cores are to be withdrawn so soon as the cast material is set, that the due contraction of the cast material, while cooling, may take place.

I would mention that if it be desired that the melted material above mentioned should, for any particular purpose, flow more freely, then a flux, such as soda, may be added. I have, however, not found it necessary in ordinary cases to do so.

Having thus described the nature of my invention, and the best manner I am acquainted with for performing the same, I would have it understood that I do not confine myself to the details herein given, so long as the peculiar character of my invention be retained.

But what I claim is,

The melting of the material above mentioned, and running it into suitable moulds to obtain castings of the same as herein described.—In witness, &c.

HENRY ADCOCK.

Enrolled April 3, 1852.

Specification of the Patent granted to JOHN DAVIES MORRIES STIRLING, *of Black Grange, North Britain, Esquire, for Certain Alloys and Combinations of Metals.*—Sealed December 22, 1851.

To all to whom these presents shall come, &c., &c.—In the specification of certain letters patent granted to me on the 31st of January, 1851, for "Improvements in the manufacture of metallic sheets in coating metals, in metallic compounds, and in welding," I have described, amongst other things, the coating iron with tin, and its alloys, after having coated the iron with zinc. Now I have discovered that it is advantageous to coat the iron first with copper, for which purpose the simple immersion of the iron in a solution of a salt of copper is sufficient, and then deposit the zinc on the copper, as is well understood, the articles are then dipped into the tin as in making tin-plate.

Another part of my present invention of certain alloys

and combinations of metals, consists of causing iron so coated with copper to be tinned by dipping the same into melted tin, as when making tin-plate.

Another part of my invention consists of causing iron so coated with copper to be coated with zinc, by dipping in melted zinc, in the usual manner of coating iron with zinc.

I would remark I prefer that the iron so coated with copper, or with copper and zinc, should previous to the dipping in melted zinc or melted tin, be passed between polished rolls, care being taken not to render it too brittle by over pressure. Instead of using acid to cleanse the surfaces previous to dipping, I use a saline solution, and I find sal-ammoniac to answer well for this purpose.

Another part of my invention has for its object the combining certain alloys of lead, harder than lead, with a coating of tin, or some of its ductile alloys. This combination may be advantageously substituted in some cases for Queen's metal, British plate, Britannia metal, pewter, or similar alloys. To produce this combination, I proceed as follows: —I take the hardened lead in the form of cake or otherwise, as may be most convenient, and after subjecting it to the action of the rolls, so as to produce an even surface, and to reduce it to the required thickness, I take a piece of tin, or suitable alloy thereof, which I roll down to the required thickness, (from a tenth to a twentieth of the thickness of the alloyed lead, I have found to answer well,) I then place such tin or alloyed tin on one or both surfaces of the hardened lead, taking care that such surfaces are clean, and that the tin or alloy thereof is placed as flatly and smoothly as may be on the hardened lead; I then apply pressure by means of rolls, at first chiefly to bring the coating and coated metals into as near contact as may be; I subsequently employ stronger pressure by giving, what is technically called a "severe pinch," by means of the rolls, and it will be usually found that the combination or adhesion takes place at the third or fourth passage through between the rolls. The rolling is to be conducted subsequently, as when rolling tin, Britannia metal, and other ductile alloys of tin. Lead may be hardened in various ways, and such hardening is well understood. For the above purposes, however, I prefer the following modes of hardening:—I produce an alloy of zinc and tin by melting them

together, and although various proportions of these metals may be so melted together, as to form an alloy suitable for hardening lead; I find an alloy of equal weights of tin and zinc suitable, and this I add to lead, in the proportion of five parts of the alloy to ninety-five parts of the lead. The metals when melted together should be thoroughly well mixed by stirring.

I have found that the addition of antimony in the proportions of one part of antimony to fifteen of lead answers well for many purposes. Antimony may be added in various proportions to lead for hardening it, but I do not recommend that such additions should exceed one-ninth of the weight of the lead, as excess of antimony produces brittleness. Arsenic, in the proportion of from one to two per cent., renders lead sufficiently hard for many of the above purposes, and the making such alloy is well understood.

I prefer tin, Britannia metal, tin, hardened with antimony, as the coating-metal for these hardened alloys of lead. I do not, however, confine myself to the above means of hardening lead for being coated, nor to any particular alloy of tin as the coating-metal, so long as the relative hardness of the coated and coating-metal allows of combination (and extension) by means of pressure, whether such pressure be produced by rolling, by drawing through orifices or otherwise. I am aware that lead has before been coated with tin by pressure; I wish it, therefore, to be understood that this part of my invention consists of combining hardened alloys of lead with tin, or ductile alloys of tin, which combinations of metals will be found suitable in many cases as substitutes for Queen's, Britannia, and other metal.

Another part of my invention relates to coating zinc with lead and ductile alloys of lead, so as to produce combined or coated metals, suitable for many purposes.

In carrying out this part of my invention, I employ pure or ordinary lead or alloy of lead with tin as the coating-metals when the combined metal is to be employed for roofing, the lining of cisterns, and the like; when desired the lead employed may be hardened, as above described.

Another part of my invention has for its object the combining zinc or tin or their ductile alloys with cadmium by pressure, for which purpose I roll out the cadmium into sheets, and apply them to sheets or plates of zinc or of tin

or of their said alloys and subject them to pressure, as above explained.

I also in like manner coat zinc and its ductile alloys with tin and its ductile alloys, and I occasionally use arsenic to harden the tin for coating, and I find from one to two per cent. of arsenic sufficient, although I do not confine myself to these proportions.

Another part of my invention consists in coating copper and its ductile alloys with tin and ductile alloys thereof by pressure, which I perform as above explained in regard to other metals.

Another part of my invention has for its object to coat tin, Britannia metal, and other suitable ductile alloys of tin with silver, by means of pressure; and I also employ silver as a coating metal on zinc, and to effect these I proceed as in coating or covering zinc, hardened lead, and other metal, as already described.

Another part of my invention consists of employing gold or platinum in like manner as a coating metal by combining it with tin and ductile alloys thereof.

As a general rule for the guidance of the workmen in coating one metal with another by pressure, I would remark that the harder the metals or alloys are the more care is required to ensure their perfect union. The surfaces should also be clean, and they should be laid flatly and smoothly together.

Another part of my invention consists in casting certain of the more fusible metals, such as zinc, alloyed zinc, tin, and alloyed tin, on plates of silver or platinum, and such casting is performed by simply running the melted metal on to the less fusible metal, and then rolling them to any required thickness.

Another part of my invention has for its object to solder or otherwise unite by means of heat, German silver to copper and alloys of copper, and then to roll them, as is well understood, in the making of other plates or sheets.

Another part of my invention consists in the addition of chromium to iron, which I find to improve the quality; I prefer making such addition by means of the ore usually called chrome-iron or chromate of iron, and I find from $\frac{1}{800}$ to $\frac{1}{400}$ of each puddling charge to answer well; but it may be introduced at an earlier stage; and where the iron is particularly cold, or red, short, I add a chloride, and I

prefer common salt at the rate of about one pound and a half to three pounds weight to each charge; I prefer adding the chromate when the iron is nearly or quite melted, and I find that the softer iron takes more than the harder class of iron. The chloride may be added at the same time, but I prefer the making such addition when the melted iron begins to boil, or, if possible, before it comes to nature.

Another part of my invention is to add baryta or its salts or compounds to iron, and this I do by preference by means of the carbonate of barytes, as above described; when treating of the addition of chromium to iron, I have found that one pound of the carbonate to each charge of the puddling furnace answers well and improves the iron.

Another part of my invention consists of adding carbonate of lime and muriate of soda to iron, to improve its quality; and for this purpose I mix carbonate of lime with chloride of soda (common salt), and I find equal proportions to answer well; about two to three pounds of this mixture are to be added to the charge of iron when melted, or nearly so, in the puddling furnace.

Another part of my invention consists of using an alloy of tin with arsenic, or lead and arsenic on iron. These alloys are applied to or coated on the iron when hot, in like manner as soldering or tinning. The combination of iron with the last-mentioned alloys will be serviceable for shipbuilding and similar purposes. The iron for these purposes may advantageously be first coated with copper.

Another part of my invention consists of applying lead or ore of lead in the process of making iron in the blast furnace, and I also employ, in combination with lead or lead ore or oxide of lead, chlorides, preferring common salt for this purpose. In carrying out this part of my invention in charging a blast furnace, I throw in at the rate of from one to two pounds of lead to the ton of iron ore; and when this chloride is used, I prefer to throw the same into the furnace with the lead, lead oxide, or other compound of lead; and the quantity of chloride of sodium I use is at the rate of fifteen to twenty-five pounds for each ton of iron ore; but I do not confine myself to these quantities. The iron thus made will be found more free from impurities, and more suitable for making wrought-iron.—In witness, &c.

John Davies Morries Stirling.

Enrolled June 22, 1852.

Specification of the Patent granted to THOMAS BELL, *of Don Alkali Works, South Shields, for Improvements in the Manufacture of Sulphuric Acid.*—Sealed June 24, 1852.

To all to whom these presents shall come, &c., &c.— My invention consists,

First, of applying currents of electricity in sulphuric acid chambers or apparatus for the purpose of promoting the union of oxygen and sulphurous acid gas, thereby producing sulphuric acid, and effecting a saving of the nitre or nitric acid now used.

Secondly, my invention consists of obtaining and applying continuous streams of ozone to act on sulphurous acid in the manufacture of sulphuric acid. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

In carrying out the first part of my invention I prefer to employ electric currents obtained by means of jets of steam, but I do not confine myself thereto, as other sources of electricity may be resorted to. I employ an ordinary sulphuric acid chamber, and in place of or in addition to the use of nitre or nitric acid, as heretofore employed, I obtain and apply streams of electricity; and I would state that the arrangement of apparatus for this purpose may be varied, but that which I believe to be the best consists of numerous jets of steam, such as are used in hydro-electric machines, preferring to use that known as Armstrong's, and such as are well understood; and I have used for a full-sized sulphuric-acid chamber twenty-four jets of steam (of fifty pounds pressure in the boiler) passing through passages of about one quarter of an inch diameter, and opposite thereto I employ a collector having numerous small metal points, such collector consisting of an iron tube or rod of three quarters of an inch diameter, such apparatus being similar to what is now well known, and in itself is not claimed by me. To the end of this collector I affix a bar or rod of lead or other suitable metal, the end of which I pass into a glass pipe in connexion with the chamber, and from the end of which rod the electricity streams, and through which pipe the sulphurous acid flows into the sulphuric-acid chamber,

by which means the sulphurous acid will be converted into sulphuric acid, and this without the necessity of employing nitre or nitric acid; at the same time, it may be remarked that in place of wholly dispensing with the use of nitre or nitric acid, the streams of electricity may be used in conjunction with some nitre or nitric acid, in which case the quantity of nitre or nitric acid will be reduced in proportion to the employment of currents of electricity; then, in place of introducing the end of the bar or rod of lead or other suitable metal into a glass pipe through which the sulphurous acid passes into the chamber, I introduce the end of such bar or rod of lead or other suitable metal into a separate pipe of glass, the outer end of which is stopped, or for the most part stopped, and the inner end opens into the sulphuric acid chamber. I would remark that as steam is required within the sulphuric acid chamber, it will be desirable to introduce the same by jets suitably arranged for obtaining electricity; but I would state that I have found that if all the jets be introduced into the chamber, the acid becomes too much diluted. I, therefore, recommend that only so many jets should be introduced into the chamber as will supply the necessary steam.

I will now describe the second part of my invention, and in doing so I would remark, that ozone is known to have the property of converting sulphurous acid into sulphuric acid. In the experiments, however, which have been resorted to, in ascertaining and illustrating this fact, several hand jars or vessels have been used; but in such experiments there have been no combination of apparatus, such as to cautiously and concurrently produce ozone and sulphurous acid, in a manner to continuously produce sulphuric acid. I do not, therefore, claim to have discovered the fact that sulphurous acid is converted into sulphuric acid by ozone. This part of my invention consisting of arranging apparatus in such manner that ozone and sulphurous acid may be continuously produced, and the sulphurous acid converted into sulphuric acid, the object being to obtain practical means of manufacturing sulphuric acid by the use of ozone. The means hereinafter described for procuring ozone are, I believe, the best for the purpose. I do not, however, confine myself thereto, as other means may be resorted to for preparing or producing ozone. In carrying out this part of my invention, I use an ordinary fixed sulphuric-acid chamber; and, so far as my experience goes, I

have found that ozone acts most advantageously when the temperature ranges between sixty and seventy degrees of Fahrenheit. Into the sulphuric-acid chamber a continuous supply of sulphurous acid is caused to flow as heretofore; and my invention consists of supplying thereto ozone continuously produced in any convenient manner, and allowed to flow from the apparatus as produced to combine with the continued supply of sulphurous acid; and the most convenient apparatus for, and means of obtaining, a continuous production and evolution of ozone with which I am acquainted are as follows:—I construct boxes or chambers of iron or earthenware, which I prefer to be about sixteen inches and a half wide, twelve inches from front to back, and twenty-six inches high, from the upper part of which box or chamber proceeds a tube or pipe (leading to the sulphuric-acid chamber) of about four inches and a half diameter, by which the ozone as it is produced passes into the sulphuric-acid chamber. About eight inches from the bottom are two holes in front of each box, about three-eighths of an inch diameter, and there is a tray or drawer, which is capable of being slided into an opening near the bottom, in which is placed several sticks of phosphorous immersed in water, to the extent of about half their diameter. I have used twelve sticks, seven inches long and three-eighths to half an inch diameter, in each of such trays, and for a large sulphuric-acid chamber, 200 feet × 19 × 16 feet. I have employed twelve such boxes or apparatus, and I have replaced the drawers with others having thereon fresh sticks of phosphorous, about every twelve hours, unless the phosphorous becomes inflamed, in which case I have changed the same earlier, and I do not use the same sticks of phosphorous again until they have been remoulded. By this arrangement I have been enabled to save a very considerable part of the nitre or nitric acid formerly used, and I am induced to imagine that the use of nitre and nitric acid may ultimately be wholly dispensed with in the manufacture of sulphuric acid; and I believe that it will be found advantageous to pass the sulphurous acid and the ozone into a column filled with coke, pumice-stone, or other suitable material, before they pass into the sulphuric-acid chamber. The sulphurous acid I obtain by having sulphur, or matters containing sulphur, as heretofore practised when using nitric or nitric acid only.

Having thus described the exact apparatus and means

of obtaining and applying ozone used by me, I wish it to be understood that I do not confine myself thereto, as the same may be varied, or other arrangements of apparatus and means of obtaining and applying ozone may be resorted to in carrying out my invention, so long as a supply of ozone is kept up to convert the continued fresh supply of sulphurous acid into sulphuric acid. And I would have it understood that what I claim is,

First, applying currents of electricity in sulphuric acid chambers or apparatus, thereby promoting the union of oxygen and sulphurous acid; and

Secondly, I claim the obtaining and applying ozone to act on a continued production of sulphurous acid in the manufacture of sulphuric acid.—In witness, &c.

THOMAS BELL.

Enrolled October 28, 1852.

SCIENTIFIC MISCELLANEA.

New Method of Precipitating Oxide of Tin and separating it from other bodies, and of combining it with Silk, Woollen, and Cotton Fabrics.

BY J. LÖWENTHAL.

WHILE endeavouring to find a simple and accurate means of detecting small quantities of perchloride of tin in protochloride, the author found that alkaline sulphates possess the property of decomposing the perchloride and precipitating hydrated oxide from the aqueous solution, while they do not exercise the slightest influence upon the protochloride when atmospheric air is excluded.

In order to prove that it was the alkaline sulphate and not the water dissolving it which effected the decomposition, Löwenthal made the following experiments.

A gramme of anhydrous perchloride of tin was treated in two experiments with 100 and 60 cubic cent. of cold water. The one solution began to lose its clearness after 2 or 3 hours, the latter not till after 36 hours, then very feebly, and it was not milky until after a week. Having thus ascertained the proportion of water which might be employed without fearing decomposition, he mixed,—

a. 0·5 grm. perchloride with a solution of 1 grm. crystallized sulphate of soda in 30 cub. cent. water at 64° F. A precipitate was immediately formed.

b. The experiment *a.* was altered by adding 0·125 grm. hydrochloric acid, 1·12 sp. gr., to the perchloride of tin. The liquid was at first turbid, and after one minute the decomposition was complete.

c. On using 0·25 grm. hydrocholric acid, it was not complete until after 3 minutes, with 0·375 grm. 10 min., with 0·5 grm. 43 min., and with 0·75 grm. of acid the liquid remained clear for several hours.

d. 0·5 grm. perchloride with 0·5 grm. hydrochloric acid and 30 cub. cent. water containing 2·5 grm. crystallized sulphate of soda, were mixed at 64° F.: remained at first clear, and the decomposition was not completed until after 7 minutes.

e. The experiment *c.* with 0·5 grm. acid repeated. The liquid at first clear, immediately gave a precipitate when heated to about 108° F.

f. 0·5 grm. protochloride treated with only 15 grms. water containing 1 grm. sulphate of soda. Liquid at first clear, gave a precipitate when heated which did not disappear on cooling.

g. Metastannic acid long digested with hydrochloric acid and the residue dissolved in water. On the addition of sulphate of soda the decomposition ensued immediately. It follows from these data that,—

1. The decomposition takes place in the cold only when a certain quantity of water is present.

2. In the absence of free acid, with an adequate quantity of water and with about 2 equivs. sulphate of soda to 1 equiv. perchloride of tin, the decomposition takes place immediately.

3. Free acid hinders the decomposition more or less in proportion to its quantity. Its influence may be removed by the careful addition of ammonia. Chloride of ammonium does not cause the decomposition of the perchloride.

4. With equal quantities of free acid the decomposition takes place more rapidly, the greater the quantity of sulphate of soda.

5. Heat favours the decomposition in all cases.

Löwenthal likewise found that the sulphates of magnesia, alumina, protoxide of manganese, iron, zinc, and copper, peroxide of iron, produced the same decomposition;

moreover, nitrates of soda, ammonia, baryta, zinc, and copper.

He found that the precipitate was pure hydrated oxide of tin, and never contained any of the acid of the precipitant. He considers the decomposition to be represented by

$$SnCl^2+4NaOSO^3+4HO=SnO^2\,2HO\,(?)+2NaCl$$
$$+2(NaO,\ HO,\ 2SO^3).$$

Although in this equation 4 equivs. sulphate of soda are given, the decomposition takes place with 2 and even with 1 equiv., but a larger quantity of water is then necessary. In this case acid is set free; however, with a sufficiency of water this does not permanently hinder the decomposition (in which the tendency of the hydrated oxide of tin to separate certainly plays an important part), especially at an elevated temperature. The influence of this latter condition was indeed to be expected, since Fremy has shown that the solution of hydrated oxide of tin in dilute sulphuric acid is decomposed by boiling.

It now remained to prove that by this means all the tin present as perchloride was precipitated, and that the separation of the tin and chlorine was complete. The decomposition was effected with sulphate of soda (A) and nitrate of ammonia (B). 100 parts of a solution of perchloride of tin gave the following results:—

	A.			B.	
	Tin.	Chlorine.		Tin.	Chlorine.
1.	4·964	5·976	1.	4·935	5·962
2.	4·975	5·956	2.	4·948	5·971

Consequently 100 parts anhydrous perchloride of tin would contain:—

	Calculated.	Found.			
		A.		B.	
		1.	2.	1.	2.
Sn. eqt. wt. ...	45·30	45·37	45·51	45·38	45·32
2Cl. eqt. wt. ...	54·70	54·63	54·49	54·62	54·68
	100·00	100·00	100·00	100.00	100.00

These results show that the separation is effected with great accuracy.

This behaviour of oxide of tin admits of several useful applications; among others—

1. The detection of tin in almost any liquid.
2. It affords an exact and simple means of quantitatively

determining tin, as well as an easy and perfect means of separating it from chlorine and other halogens from alkalies, &c.

It is of especial worth to manufacturers in determining the commercial value of tin salts. In the absence of delicate balances, they generally have recourse to the nitric acid test, which always gives an incorrect result, in consequence of the volatilization of the chloride of tin.

In some experiments on the quantitative separation of oxide from binoxide of tin, I obtained on mixing 9·0723 of the above solution, to which a few drops of hydrochloric acid had been added with 10·6196 of a solution of protochloride corresponding to 16 per cent. of protoxide, 0·6792 protoxide of tin, corresponding to 0·5339 grm., or calculated for 100 parts of the solution 5·002, consequently only 0·042 per cent. more than the average of the above results, which amounts to 4·960.

3. It affords a very suitable means of combining oxide of tin with cotton, woollen, and silk stuffs in dyeing. Löwenstein considers that the experiments made by him justify the opinion that this method, *properly employed*,* has great advantages over the use of the expensive alkaline stannates.

4. Dark colours containing tin may be conveniently made by this means.—*Journ. für Prakt. Chem.*, lvi., p. 366.

LIST OF ENGLISH PATENTS.

Pierre Jules Lamaille, of Paris, in the Republic of France, Manufacturer, for Certain improvements in the preservation of japanned leather.—Sealed December 1, 1852.—(*Six months.*)

William Gorman, of Glasgow, in the county of Lanark, North Britain, Engineer, for Improvements in obtaining motive power, which improvements or parts thereof are applicable for measuring and transmitting aeriform bodies and fluids.—Sealed December 8, 1852.—(*Six months.*)

William Hodgson, of Skircoat, in the county of York, Engineer, for Improvements in the manufacture of woven textile and looped fabrics, and in the machinery employed therein.—Sealed September 30, 1852.—(*Six months.*) This patent being opposed at the Great Seal was not sealed till

* The mode of employment is not stated by the author.

the 15th of December, 1852, but bears date the 30th of September, 1852, by order of the Lord Chancellor.

George Shaw, of Birmingham, in the county of Warwick, for Certain improved machinery for making envelopes and bags.—Sealed December 17, 1852.—(*Six months.*)—(Communication.)

Robert Burn, of Edinburgh, Scotland, Practical Engineer, for A certain improvement in steam engines.—Sealed December 21, 1852.—(*Six months.*)

Robert Galloway, of Cartmel, in the county of Lancaster, for Improvements in manufacturing and refining of sugar.—Sealed December 21, 1852.—(*Six months.*)

51. Thomas Craddock, of the Ranelagh Works, Thamesbank, in the county of Middlesex, Engineer, for Certain improvements in the steam-engine and the steam-boiler. Dated October 1.—Sealed December 8, 1852.

70. Robert Lakin, of Ardwick, in the county of Lancaster, Machinist, and William Henry Rhodes, of Gorton, in the said county of Lancaster, Mechanic, for Improvements in machines for spinning and doubling cotton and other fibrous substances. Dated October 1.—Sealed December 8, 1852.

88. George Holcroft, of Manchester, in the county of Lancaster, Engineer, for Certain improvements in steam-engines. Dated October 1.—Sealed December 8, 1852.

96. Henry Bridson, of Bolton-le-Moors, in the county of Lancaster, Bleacher, for Improvements in machinery to facilitate the rinsing, washing, and cleansing of fabrics, which machinery is also applicable to certain operations in bleaching and dyeing. Dated October 1.—Sealed December 8, 1852.

117. John Wilson Fell, of Glasgow, in the county of Lanark, North Britain, Rope and Sail Maker, for Improvements in preparing and spinning hemp, and other fibrous materials, for the purpose of making ropes, twines, and other similar articles. Dated October 1.—Sealed December 8, 1852.

151. David Wilkinson Sharp, of Bingley, in the county of York, Manufacturer, for Improvements in machinery for combing and drawing a sliver of wool, flax, silk waste, and other fibrous substances, and in apparatus for constructing screws to be used in a part or parts of such machinery. Dated October 2.—Sealed December 8, 1852.

187. Alexander Miller, of Glasgow, in the county of

Lanark, North Britain, Manager, for Improvements in the treatment or finish of textile fabrics and materials. Dated October 2.—Sealed December 8, 1852.

188. JOHN WEEMS, of Johnstone, in the county of Renfrew, North Britain, Tin Smith, for Improvements in obtaining and applying motive power. Dated October 2.—Sealed December 8, 1852.

190. JAMES ANDERSON YOUNG, of the firm of A. S. Young and Son, of 185, Buchanan-street, Glasgow, in the county of Lanark, North Britain, Surgeon Dentist, for Certain improvements in dental operations, and in apparatus or instruments to be used therein. Dated October 2.—Sealed December 8, 1852.

214. THOMAS KENNEDY, of Kilmarnock, in the county of Ayr, North Britain, Gun Manufacturer, for Improvements in obtaining and applying motive power, which improvements or parts thereof are applicable to time-keepers and clock-work, and for measuring and registering the flow of water and other fluids, and aeriform bodies. Dated October 4.—Sealed December 8, 1852.

215. JOHN ERSKINE, of Greenock, in the county of Renfrew, North Britain, Felt Manufacturer, for Improvements in the manufacture of felted and cemented fabrics. Dated October 4.—Sealed December 8, 1852.

255. JOHN CROOK, of Manchester, Packer, and JOHN WILKINSON WOOD, of the same place, Manager, for Certain improvements in the method of preserving hoop-iron from oxidation or decay. Dated October 6.—Sealed December 8, 1852.

279. JAMES CLARK, of Chapel-house, Paisley, in the county of Renfrew, North Britain, Esquire, for Improvements in weaving carpets and other fabrics, and in the machinery or apparatus employed therein. Dated October 6.—Sealed December 8, 1852.

294. MITCHEL THOMSON, of Plymouth, in the county of Devon, Surgeon in the Royal Navy, for Improvements in lamps and in the production of artificial light. Dated October 7.—Sealed December 8, 1852.

304. JOHN PATERSON, of Wood-street, in the city of London, Manufacturer, for Improvements in buckles or fastenings. Dated October 8.—Sealed December 8, 1852.

314. RICHARD HUSBAND, of Manchester, in the county of Lancaster, Hat Manufacturer, for Certain improvements in weaving hat plush and other textile fabrics. Dated October 9.—Sealed December 8, 1852.

325. John Henry Johnson, of 47, Lincoln's-inn-fields, in the county of Middlesex, and of Glasgow, North Britain, Gentleman, for Improvements in composing and distributing type. Dated October 9.—Sealed December 8, 1852.

331. David Laidlaw, of Glasgow, in the county of Lanark, North Britain, Iron and Brass Founder, for Improvements in the manufacture or production of gas-burners. Dated October 11.—Sealed December 8, 1852.

364. Matthew Smith, of Over Darwen, in the county of Lancaster, Manager, for Improvements in machinery for weaving and printing. Dated October 13.—Sealed December 8, 1852.

367. Peter Armand Le Comte de Fontainemoreau, of 4, South-street, Finsbury, London, and 39, Rue de l'Echiquier, Paris, for A certain chemical combination for the silicatisation of calcareous matters. Dated October 13.—Sealed December 8, 1852.—(Communication.)

369. Thomas Suttie, of Greenock, in the county of Renfrew, North Britain, Smith, for Improvements in roasting apparatus. Dated October 13.—Sealed December 8, 1852.

428. John Campbell, of Bowfield, in the county of Renfrew, North Britain, Bleacher, for Improvements in the treatment or finishing of textile fabrics and materials. Dated October 18.—Sealed December 8, 1852.

77. Stephen Soulby, of Ulverston, in the county of Lancaster, Printer, for Improvements in machinery for letterpress printing. Dated October 1.—Sealed December 11, 1852.

78. William Smith, of Kettering, in the county of Northampton, Agricultural Implement Maker, for Improvements in machinery or apparatus for cleaning currants, raisins, and other fruits or vegetable substances. Dated October 1. —Sealed December 11, 1852.

79. Henry Smith, of Stamford, in the county of Lincoln, Agricultural Implement Maker, for Improvements in reaping machines. Dated October 1.—Sealed December 11, 1852.

80. Matthias Walker, of Horsham, in the county of Sussex, Ironmonger, for An improved ash-pan, or apparatus for taking up ashes and cinders, and separating or sifting them. Dated October 1.—Sealed December 11, 1852.

81. Frederick Osbourn, of Albion-street, King's Cross, in the county of Middlesex, Tailor, for A machine or apparatus for facilitating the manufacture of various kinds of garments or wearing apparel. Dated October 1.—Sealed December 11, 1852.

237. Herm Jager, of Ludgate-hill, in the city of London, Merchant, for Improvements in the treatment of cotton and other similar fabrics by the introduction of chemical agents, to supersede the use of dung in the dunging process. Dated October 5.—Sealed December 11, 1852.

290. William Horsfield, of Swillington Mills, near Leeds, in the county of York, Miller, for Improvements in splitting, crushing, and grinding corn, seeds, grain, minerals, or other substances. Dated October 7.—Sealed December 11, 1852.

407. Charles Henry Waring, of Neath Abbey, in the county of Glamorgan, Iron Master, for Improvements in the cutting and working or quarrying of coal, stone, shale, clay, and other similar substances. Dated October 15.—Sealed December 11, 1852.

150. Thomas Boyd, of Glasgow, in the county of Lanark, North Britain, Calico Printer, for Improvements in the treatment or finishing of woven fabrics. Dated October 2. —Sealed December 15, 1852.

193. Ralph Errington Ridley, of Hexham, in the county of Northumberland, Tanner, for Improvements in cutting and reaping machines. Dated October 2.—Sealed December 15, 1852.

370. Robert Pinkney, of 26, Long-acre, in the county of Middlesex, Ink Manufacturer, for Improvements in cases for holding marking materials. Dated October 13.—Sealed December 15, 1852.

380. Alfred Augustus De Reginald Hely, of Cannon-row, Westminster, in the county of Middlesex, for An improved waiter or tray. Dated October 14.—Sealed December 15, 1852.

409. Evan Leigh, of Manchester, in the county of Lancaster, Cotton Spinner, for Certain improvements in machinery or apparatus for carding cotton and other fibrous materials. Dated October 16.—Sealed December 15, 1852.

423. Samuel Fletcher Cottam, of Manchester, in the county of Lancaster, Machinist, for Improvements in quarrying slate. Dated October 18.—Sealed December 15, 1852.

425. William Roberts, of Millwall, Poplar, Foreman to Messrs. Brown, Lenox, and Co., of Billiter-square, for Improvements in machinery for stopping and lowering cables and other chains. Dated October 18.—Complete specification.—Sealed December 15, 1852.

426. George William Lenox, of Billiter-square, in the city of London, Chain Cable Manufacturer, and William

Roberts, of Millwall, Poplar, Foreman to Messrs. Brown, Lenox, and Co., of Billiter-square aforesaid, for Improvements in machinery for raising and lowering cables and other chains.—Complete specification. Dated October 18. —Sealed December 15, 1852.

475. John Currie, of Glasgow, in the county of Lanark, North Britain, Miller, for Improvements in grinding wheat and other substances, and in the treatment and preparation of such substances and the products thereof. Dated October 21.—Sealed December 15, 1852.

95. William Oxley, of Manchester, in the county of Lancaster, Merchant and Mill Furnishing Manufacturer, for Improvements in apparatus for heating and drying. Dated October 1.—Sealed December 18, 1852.

404. William Stevenson, of Preston, in the county of Lancaster, Manager, for Improvements in weft forks for power looms. Dated October 15.—Sealed December 18, 1852.

463. William Harrison, of Blackburn, in the county of Lancaster, Machinist, for Certain improvements in machinery or apparatus for sizeing and otherwise preparing cotton, wool, flax, and other warps for weaving. Dated October 20.—Sealed December 18, 1852.

502. Charles William Graham, of Bishopsgate-street within, in the city of London, Merchant, for Improvements in the manufacture of bottles and jars. Dated October 23. —Sealed December 18, 1852.

540. Thomas Potts, of Birmingham, in the county of Warwick, Tube Maker, for Improvements in the manufacture of hinges. Dated October 27.—Sealed December 18, 1852.—Complete specification.

603. David Thomson, of Dundee, in the county of Forfar, Manufacturer, for Improvements in the manufacture of carpets. Dated November 1.—Sealed December 18, 1852.

128. William Rogers, of 125, Long-acre, in the county of Middlesex, for Improvements in studs, buttons, and other fasteners. Dated October 1.—Sealed December 18, 1852.

309. James Yule, of St. Luke's-terrace, in the city of Gloucester, Mechanician, for An improved arrangement of sawing machinery. Dated October 8.—Sealed December 18, 1852.

360. George Lloyd, of the parish of Budbrooke, in the county of Warwick, Doctor of Medicine, for An improvement or improvements in the manufacture of paper. Dated October 13.—Sealed December 18, 1852.

398. HERMANN TURCK, of Broad-street Buildings, in the city of London, Merchant, for Improvements in propelling vessels. Dated October 15.—Sealed December 18, 1852.

103. CHARLES LUNGLEY, of Poplar, in the county of Middlesex, Ship Builder, for Improvements in ship-building. Dated October 1.—Sealed December 22, 1852.

108. THOMAS FEARN, of Birmingham, in the county of Warwick, Electro-Metallurgist, for Certain improvements in ornamenting metallic surfaces, and in machinery and apparatus to be employed therein. Dated October 1.—Sealed December 22, 1852.

112. HERMANN TURCK, of Broad-street Buildings, in the city of London, Merchant, for Improvements in packing goods. Dated October 1.—Sealed December 22, 1852.

115. CHARLES JOHN CARR, of Belper, in the county of Derby, Engineer, for Improvements in machinery for making bricks and other similar articles. Dated October 1.—Sealed December 22, 1852.

97. JOHN M'MILLAN DUNLOP, of Manchester, in the county of Lancaster, Engineer, for Improvements in the manufacture of wheels for carriages. Dated October 1.—Sealed December 24, 1852.

174. ALEXANDER CAMPBELL DUNCAN, of Glasgow, Calico Printer, for Improvements in the art or process of dyeing cotton or other textile fabrics, or cotton or other yarns, when printed or mordanted with the colouring matter of madder, or of dyewoods, and in machinery or apparatus employed therein. Dated October 2.—Sealed December 24, 1852.

285. EDWIN PETTITT, of Kingsland, in the county of Middlesex, Civil Engineer, and JAMES FORSYTH, of Caldbeck, Cumberland, Spinner, for Improvements in spinning and drawing cotton, and other fibrous substances, and in machinery for that purpose. Dated October 7.—Sealed December 24, 1852.

355. EDWARD LLOYD, of Dee Valley, near Corwen, Merionethshire, North Wales, Engineer, for Certain improvements in steam engines, the whole or part of which improvements are applicable to other motive engines. Dated October 13.—Sealed December 24, 1852.

550. JOHN WORMALD, of Manchester, in the county of Lancaster, Maker-up and Packer, for Improvements in machinery or apparatus for roving, spinning, and doubling cotton, wool, or other fibrous substances. Dated October 28.—Sealed December 24, 1852.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 2. Vol. XXI. ENLARGED SERIES.—FEBRUARY, 1853.

Specification of the Patent granted to Edward Maitland Stapley, *of Cheapside, for Improvements in Cutting Mouldings, Grooves, Tongues, and other forms, and in Planing Wood.*—Sealed July 6, 1852.—(Communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The first part of the invention consists in the arrangement and construction of machinery for planing boards and planks, and the working of mouldings. And in order that this part of the invention may be fully understood and readily carried into effect, I will proceed to describe the same, reference being had to the accompanying drawings marked A.

Fig. 1, represents a horizontal section through the planing machinery.

Fig. 2, represents a top view of the machine.

Fig. 3, represents an end view; and

Fig. 4, a side view of one of the series of platforms for feeding in the material to be planed, with some of its

parts in detail. Similar letters in the several figures represent the same parts. The nature of the invention, and that which distinguishes it from all other things before known, consists,

First, in the elastic stock and cutter, they being so attached to the side plates or knife-stock-frames (to which all the stocks are attached) that the heel of the stock is made elastic without carrying the graduation of the cutting-edge of the knife. The knife is so fitted to the stock and the stock so attached to the knife-stock-frame, by a hinged bar and bolt, that the cutting-edge is in an exact line with the centre of the axle of the hinge. In all modes heretofore known and used for fixing cutters to side plates or knife-stock-frames, difficulties have occurred, and have thus far prevented their practical operation, and which difficulties my improvements effectually remove and obviate.

In all fixed stocks and cutters where they are firmly bolted to the side-plates, whether the board or cutters be removed to produce a continued shaving, splinters or "wedges" are taken from the board, where it is cutting against the grain, and are firmly bedded under a fixed stock, thereby causing great resistance and pressure, and frequently a "breaking up" of the stocks or bed. This is an almost invariable result in running a larger portion of the lumber than required to be worked by power machines. But, when the stocks are made elastic, this does not occur; if it should, however, the splinters and "wedges" are permitted to pass out by the elasticity of the stocks. A fixed stock or cutter without a self-adjustable throat is inoperative, from the fact, that, if the cutters are graduated to any given thickness of shaving, the lumber must be of sufficient thickness to allow all the cutters to take off the shavings of the graduated thickness. If otherwise, it be thin, (as most lumber from the saw has great inequalities in its thickness,) and a cutter graduated to an eighth of an inch shaving, and the thickness of the board only permits it to take off one-half of that thickness (if against the grain); the wood before that cutter will be raised to the thickness of the graduation, and the board split in the direction of the grain to a considerable depth, and thereby clogging the throat, breaking and tearing the board, and if the board is separated will form a wedge under the stock, and the next board in passing will "break up" the machine.

Another difficulty is found in practical operation with a

fixed stock and cutter having a separate yielding-bar for a throat or mouth-piece; the bar cannot be made to operate as a self-adjusting throat, it being held by springs at each end, and inserted between the cutters, it is raised by the board in passing; and being separate it is raised unequally, if the spring be fixed at the same pressure at the two ends, and the board pressed through at any point on one side of the centre of the bar, that end to which the board passes the nearest, will be raised the highest, the result being that the bar bears hard on the edge of the board nearest the centre, whilst it is raised clear from the other edge. This leaves that portion without a pressure, and if the cutters are working against the grain the wood will be torn to a considerable depth and broken, the lumber destroyed, and the machine "broken up."

Separate bars combined with stationary stocks and cutters are not self-adjusting, but require perpetually to be altered to suit the width of lumber worked, and the difficulty in adjusting them to the proper pressure at the two ends of the bar to suit all and every width of the board amounts to a prohibition of their practical use.

In the improved stock-fastenings and cutters none of the above difficulties occur; the edge of the cutter being at the point of the centre of the axle, and the heel of the stock elastic, the stock itself presses upon the board, and holds it to the bed, and its bearing is always in a line with the cut, whether the board is wide or narrow, or the springs be of unequal pressure or not; it is a self-adjusting throat, and no wedges will be caused by an unequal pressure in consequence of the bars not bearing equally on the board, and if any do occur, they will pass out with the shavings, and in no event can the heel of the stock be fixed below the line of cut, which is a great difficulty in all fixed stocks.

The other improvement consists in the application for a bed or carrying-table for the board of the sectional endless platform. The operation of this for the purpose for which it is intended is of great practical importance in machines of this class, where the power is all exerted in the feeding of the machine.

The endless chain for this purpose being a pull instead of a push, has proved inoperative from the fact that the machine is necessarily horizontal instead of vertical, and consequently all the dirt and grit falls into the machine

and remains in the cutters, and under the heavy strain required to move the board the links in passing over the chain-wheel cut upon their axles, and in a short time become worthless. This has been the practical result of all endless chains for this purpose.

In the operation of the sectional plate-bed, the plates push each other through under the cutters; and between the points where pressure is brought upon the plates there is no lateral motion given to them, and consequently no wear.

In this mode of operation the whole power of the machine is required at the point where the rollers clamp the board to pass it through under the cutters. At this point, immediately under the centre of the axle of the roller, and under the plates, a little elevated from the fixed bed, are placed two friction-rollers, thereby relieving this point from the friction of the bed and plates.

In this machine the cutter being placed vertical, all the dirt, grit, and shaving pass off without aid; all the gearing-belts and pulleys are placed beneath the mill-floor, thus avoiding the difficulties attending gear and belts when in close proximity to the machine.

Any desired speed can be given to this machine without danger to any of its parts, the amount which it can plane being only limited by the quantity which can be fed into the machine.

By the application of reverse cutters at the tail end of the machine, both sides of the board are planed at the same operation; and by also attaching matchers to that point, lumber can be planed and matched at the same operation, and which I purpose doing in my machine.

Immediately in front of the first cutter is placed a cast-steel scorer, of about two and a-half inches in diameter, with sharp-cutting edges formed on its periphery, and which is held firmly against the board by springs, and so fitted as to cut or score to the depth of the first shaving to be taken from the board. This scores the board crosswise of the grain, so that the shaving in separating from the board does not cut into the board, but is broken up. To lubricate the sectional plates, if desired, a roller of soft material may be fixed conforming with the shape of the under side of the plates, and held against them by springs on their passage on the back of the machine, and which roller may receive or be saturated with the lubricating compound, which is

distributed to the plates. The machine is constructed in the following manner:—The frame, I, I, I, is cast with the side-plates, and the cross-bearers, F, F, F, with the fixed bed, 3, 3, 3, all in one piece.

In the grooves, A, A, between the side-plates, are fitted the sectional-plates, B, B, B, to form the endless-bed or carrying-table for the lumber. These plates are of cast-iron, and planed to an equal thickness, and on the under-side of said plates is formed a recess to fit the bed, 3, 3, 3, which guides them sidewise whilst passing under the cutters. Near either outer edge are formed racks, into which the cogs of the wheels, G, G, G, work. The plates at either end pass up and down in the grooves, A, A, and are kept in their proper position by the lugs, *x*, *x*, *x*, and the wheels, G, G. The grooves at either end are in the form of a concentric, for the purpose of passing successively each one of the series of plates from the back to the front of the machine, and *vice versâ*. The fixed bed of the machine and the grooves are planed perfectly true to fit the plates. The feed-rollers, L, L, L, two in number, are placed in advance of the cutters, and are operated by the gear-wheels, O, O, O, underneath the floor, and are connected by the shafts, Z, Z, Z, which are united together by universal-joints to permit them to be operated at any desired point from the plate-bed, and having their bearings in moveable-boxes, *h*, *h*, which are fixed in the stand, E, E, E, and are adjusted to any desired point by the spring bolts and nuts, 4, 4, 4. The pinion, M, M, M, operates the bevel-gear, K, K, which is attached to the main driving-shaft, *y*, *y*, to which the gear-wheels, G, G, are keyed to operate the plates, also the gear-wheels, O, O, to operate the rollers. The side-plates or knife-stock-frames, H, H, H, are made of cast-iron planed true and fitted to the main-frame, to which they are bolted by the bolts and nuts, R, R, working in the slots in the side-plates, which permit them to rise to any desired point for the different thickness of lumber. These plates are adjusted by the raising-screws, *q*, *q*, *q*, which may be operated by bevelled-gear and a hand-wheel, so as to move both ends of the plates simultaneously and with great precision. Upon these side-plates or knife-stock-frames sockets are formed, equal in number to that of the cutters into which the bolts, *p*, *p*, *p*, are fitted. They are raised or lowered to any desired graduation of shaving by the nuts, *m*, *m*, *m*, and made fast by the set-screws, L, L, L; the

hinges, *i*, *i*, *i*, are fixed to these bolts by the pieces, *k*, *k*, *k*. To these hinges are bolted the knife-stocks, *a*, *a*, *a*, by the bolts and nuts, *e*, *e*, *e*. These hinges are also held to the plates by the bolts and springs, *n*, *n*, *n*, and *o*, *o*, *o*. On the socket-bolts lugs are formed to support the heel of each preceding stock, which keeps it in the same relative position to the cutting-edge of the knife. To the knife-stocks, *a*, *a*, *a*, are bolted the knives and caps, B, B, and C, C, which are so fitted to the stocks as to make the cutting-edge of the knife in line with the centre of the axle of the hinges, as shown by dotted lines in fig. 2.

Underneath the heel of each stock are fitted pieces of steel, *f*, *f*, *f*, to form the required throat. The cast-steel scorer, 5, 5, 5, is fitted in front of the first cutter, and held by the springs, O^1, O^1.

The main driving-shaft rests in the step, N, N, placed underneath the floor of the mill. The rollers, *g*, *g*, are of such diameter as to travel with the same velocity as the sectional-platform or bed and are fluted on their periphery.

Figs. 5 and 6, represent a modification of my general plan, (fig. 5, being a section through the spring-bar throat-piece, cutter, and stock, and fig. 6, a front view of one-half of one of the throat-pieces, cutter, and stock, &c.,) in which A^1, represents the spring-bar throat-piece, which is attached by arms, B^1, to the frame by means of bolts, a^1, on each side of the machine, upon which it may freely turn. The throat-piece in this plan is detached from the stock, and acts independently of it, being held down, and allowed to yield to the varied pressure underneath them, by the bolt, b^1, around which is coiled a helical-spring, c^1. C^1, is the stock to which is attached the cutter, D^1. The throat-piece may have a roller, E^1, on its underside to ease the board as it passes through, and the bed may be formed of a series of rollers, F^1; to prevent the friction on the board, G^1, are slotted-plates, to which the guides, H^1, are attached for guiding the board straight through the machine. The yielding of this spring-bar throat-piece is upon the same principle as the yielding of the rear of the cutter-stock, in the first-described plan, where the rear of each stock forms a part of the throat of the succeeding cutter. The spring-bar yields upon the fixed bolts, a^1, and is held to the board by the spring, c^1, but may be held by weights or otherwise.

Having thus fully described this part of the invention, what I claim therein as new and desire to secure by letters patent is the yielding-stocks and cutters when made to yield upon an axle, the centre of which is in line with the cutting-edge of the knife. And this I claim whether the socket-bolt, hinged-bar, and nut, are or are not used for the purpose of graduating and adjusting the cutters as herein set forth.

I also claim in combination with the stationary-cutters the endless-platforms, for forming the bed, and feeding the board through the machine substantially, as described.

I also claim the independent, self-adjusting, or yielding spring-bar throat, detached from the stock, arranged so as to yield upon a fixed point or points substantially as described and represented.

I will now describe the second part of the invention, which relates to improvements in "jackers" or planing machines, reference being had to drawing B.

Fig. 1, represents a side view.

Fig. 2, represents the bolt and nut for adjusting and allowing the front of the cutter to rise and fall with the different thicknesses of boards or planks to be planed.

Fig. 3, a sectional top view of the stock and cutter. Similar letters in the several figures represent like parts.

The nature of this part of the invention consists in the application of springs or weights to each edge and end of cutter-stocks, on which knives with caps are bolted, for the planing of boards or planks, whereby they are caused to yield both on the heel and edge.

To enable others skilled in the art to make and use the invention, I will proceed to describe the same, with reference to the drawing.

In the practical use of all continued shaving cutters in power-machines for planing boards and planks, the following difficulties have occurred, and have to a great extent rendered them inoperative:—

By far the larger proportion of lumber that is planed by power-machines has imbedded in its surface sand and other gritty substances, which destroy the keen cutting edge of a series of knives; and also all lumber before it is planed is of various thicknesses. The first difficulty the improved cutter-stock, to a great extent, obviates in the following manner:—this stock is placed in advance of a series of

stocks, which are fixed by any of the known modes upon side-plates, for the purpose (by a series of cuts) of reducing boards to a uniform thickness. In this position, by the action of the springs, the knife-stock, *a*, is firmly bolted on the metal bar, *e*, with the bolt and nut, *o*. This being firmly attached, through the said bar, *e*, are passed the bolts, *r* and *n* (figs. 2 and 1), in a mortise, and by the pin, *k*, are kept from a backward or forward movement, and allowed to rise and fall at the point of the cutting-edge to a given height by the slot, *p*. The heel of the stock is held firmly by the spring, *l*, and bolt and nut, *n*, *m*. The steel plate, *t*, is firmly bolted to the underside of the stock at the heel, and forms a throat for the next knife, and by the spring, *l*, is firmly held upon the board while passing through under the cutters. The front edge of the cutter is adjusted by the nut, *j*, working in the socket, *h*, on the bolt, *r*, by which the edge can be fixed to any desired height from the bed, but by the top spring, *l*, and the slot, *p*, is permitted to rise to the inequalities of the boards or plank. This improved stock is made with a fixed throat like a hand plane, and always takes a given shaving, or one of a given thickness, which is governed by the bar of steel, *u*, which is firmly bolted on the front edge of the stock.

It will readily be perceived that the double action given by the above-described arrangement causes this plane to take the first shaving off the board or plank, whether it is thick or thin, or of an unequal thickness, and thereby removes all dirt and gritty substances from the plank or board before it comes in contact with the cutting edges of the remaining cutters; hence they are protected from the causes which destroy the keenness of their cutting edges, or in other words, it becomes a "jacker" to every board or plank, whether thick or thin.

In the running of lumber of great inequalities of thickness, it will be perceived that this cutter accommodates itself to rude inequalities, and forms a self-adjustable throat to the next cutter, which takes the unequal shaving from the board or plank. In the double action of this stock, if the cutting edge of the knife is in the act of removing a shaving from a thin board and a thick one is approaching it, the bar, *u*, that forms the throat to this cutter, it being rounded on the underside for this purpose, is caused to rise by the thick board; it being firmly fixed to the stock, it

carries up the cutting-edge with it to the plane of the thick board, but the heel is still held firmly to the thin board until raised by the thick board.

The bolt, *n*, which supports the upper spring, is hinged to the bolt, *r*, by the steel pin, *q*, by which arrangement it is allowed to vibrate with the rocking or oscillating motion given to the stock. By the square part of the bolt, *r*, at the point where the bolt passes up through the mortise in the bar, *e*, they are so fitted and adjusted that both ends of the stock rise equally, being guided by said bolt.

When this stock and cutter is used for a whole series of cutters, the adjustment of the side-plates is made in the same manner. When used thus, all these stocks after the first one would be held to a fixed position by the top springs or weights being applied with greater force. The object of this arrangement is to permit the cutting-edge to rise when one board runs under the other. This difficulty is of common occurrence in all machines where the whole power of planing is applied to the feed, and one board pushes the other through between a fixed bed and cutters, as not unfrequently boards are wedge-shaped at their ends, or wedges are formed by the separation of boards in cross-grained lumber. By permitting the stocks to rise, if the above difficulty occurs, the breaking up of the stocks or bed is prevented.

Thus, by the improved double-elastic stock, by the application of weight or springs both to the point on the stock in line with the cutting-edge of the knife, and also to the heel, this difficulty is effectually removed.

Having thus fully described the nature of the second part of the invention, what I claim therein as new, and desire to secure by letters patent, is the application of springs or weights to cutter stocks, both at their point in line with the cutting-edge of the knife and also to the heel, by which a double action is given to the stock both at the heel and edge, allowing it to rise and oscillate to the inequalities of boards or plank substantially as described, and for the purpose herein set forth.

I will now describe the third part of the invention, reference being had to Drawing C.

Fig. 1, represents a side view of the cutter-stock, with the cutters arranged in place.

Fig. 2, represents a view on the edge of the cutter-stock.

Fig. 3, represents a side, front, and end view of one of the fleam-cutters detached; and

Fig. 4, represents a side, front, and end view of one of the gouge-cutters detached. Similar letters in the several figures denote the same parts.

The nature of this part of the invention consists in arranging a series of alternate gouge and fleam, or chisel-edged cutters, with cutting lips on each side, on a cutter-stock for tonguing boards, the gouge-cutter taking off the bulk of the wood, and the fleam-cutter cutting out the corners, and smoothing out the tongue or groove,—the lip of the cutters cutting in advance of the edge preventing the wood from tearing up, or being roughened in the grooves. In the tonguing and grooving cutters heretofore in use, the shaving taken off is the whole width of the cutter; this it has been found by experience chokes up the throat of the cutter, tears the wood, and makes rough joints. By my process of taking out the shaving in three pieces, viz., by the gouge cutting a semicircular groove, and the fleam or chisel and lip-edged cutter taking out the corners, the tongue and groove are left smooth. The shaving being taken out in three pieces allows it to be discharged more freely, and also makes the throat of the cutter less liable to choke.

Another part of this invention consists in the arrangement of two sets of stationary rebating-cutters for tonguing boards in separate stocks, with a space between them for the escape of the shavings.

On a cutter stock, A, of sufficient length to admit of a series of cutters which will, by each one taking out a portion of shaving, leave the tongue or groove of the desired depth, I arrange alternately the cutters, B, B, &c., and C, C, &c. The cutters, B, B, &c., being gouge-cutters, having a semicircular cutting-edge, which removes the greater portion of the wood, and the cutters, C, C, being chisel-edged, with a cutting-lip on each side projecting beyond the edge, and which I call fleam-cutters, for cutting out the corners and smoothing the tongue and groove. The points of the cutting-edge of the lips on the fleam-cutters are in advance of the chisel-edge of said cutters, as shown at fig. 4, so as to cut the wood away from the sides of the groove in advance of the chisel-edge, which takes out the bottom and smoothes the groove.

On each of the series of gouge and fleam cutters are the inclined planes, *b*, *c*, figs. 3 and 4, both of which incline upward, and the first of which, *b*, is for guiding that portion of the shaving which is taken off next the cutter-stock up, through, and out of the throat; the other plane, *c*, is for throwing the shaving clear of the machine. These planes also give to the cutter the desired shape for being fitted close to the stock at top, and have clear ways or throats each side at the bottom or cutting part. In cutting green or wet boards, the double throat is found to be indispensable, as the gum forced out of them whilst being operated upon would choke up entirely a single throat, or so clog the machine as to make bad work. On the upper part of the cutter, where they rest against the cutter-stock, are slots for adjusting them to the proper cutting depth; and by means of screws fastened in the cutter-stock, and passing through said slot, and fastened by a nut, are the said cutters secured to said cutter-stocks.

On the side of the cutter-stock next the cutters are cast angular projections or lugs, D, which project sufficiently far from the face of the cutter-stock, A, to make a free way for the shavings between said stocks and cutters. Against the inclined front side of these angular projections rest the cutters, which makes a firm support for said cutters against the board as it is driven through the machine. On the edge of the projections, D, and immediately in the line of the cutters, and in rear of the same, are flanges or rests, *d*, figs. 1 and 2, and which answer for guides for the cutters. The plane of the series of rests or guides is at such angle with the plane of the guiding-edge of the cutter-stock, as seen in fig. 1, as that the gradual projecting of said rests, which also are the guides for setting the cutting tools, will be sufficient to cut the desired depth for the tongue or groove, each cutter taking out its respective proportion of wood or shaving. The rests, *d*, are alternately rounded to match the shape of the gouge-cutter, and square-edged to match the shape of the fleam-cutter, which respectively rest against them, and correspond in width with the cutting tools; E, E, are screw bolts firmly secured to the cutter-stock, and by which said cutter may be fastened and adjusted to the frame of the planing-machine; F, is a large reducing-gouge in front of the series of cutters for reducing the boards to an uniform width.

Having thus fully described this part of the invention,

what I claim as new therein, and desire to secure by letters patent, is the combination of a gouge or gouges for removing the bulk of the wood with smoothing tools having a cutting edge and side lip on either or both sides thereof for smoothing the sides and bottom of the groove, said gouges being set in front of said smoothing tools, as herein described and represented.

I also claim, in combination with said gouge and smoothing cutters, the lug, D, and rests or guides, *d*, therein, for the purpose of forming a throat on each side of and supporting and guiding said cutters, as herein described and represented.

I also claim the arrangement of two sets of stationary rebating-cutters, for tonguing boards in separate stocks, with a space between them for the escape of the shavings.

I will now describe the fourth part of the invention, which relates to a new and useful improvement in the construction of cutters and stocks, for tonguing and grooving boards and planks, &c., reference being had to drawing D, in which,

Fig. 1, represents a perspective drawing of one of the cutters to form the tongue.

Fig. 2, represents the back or throat part of the stock and cutters to form the tongue.

Fig. 3, represents the top of the samesto ck.

Fig. 4, represents the cutting face of the same stock.

Fig. 5, represents a transverse or cross section of the same stock. Similar letters in the several figures denote the same parts.

The nature of this part of the invention consists in the form of a series of cutters firmly bolted and adjusted to a flaring-stock to form a tongue upon boards and planks, &c. The stock for this purpose is made in two parts, of iron or other metal; the one portion to which the cutters for forming the underside of the tongue has two jointers in advance of the cutters for forming the tongue to joint the edge of the board, and to corner the tongue; this lower portion of the stock is firmly bolted or otherwise fastened to a frame, which can be attached to any planing-machine now in use, for the purpose of tonguing the boards or planks after they are brought to any required thickness. To this lower part of the stock is bolted the upper portion of the stock, with a series of cutters attached to form the upper part of the tongue, and by the set screws can be adjusted to any desired

points to give the required thickness of tongue. Both portions of these stocks are so made as to increase the opening of the throat, or discharging of the shavings, thereby obtaining an unobstructed egress from the throats of the shavings removed from the boards or planks by the cutters; the cutters to form the tongue are so graduated upon the stocks as to take a double shaving, both from the edge of the board and from the top or bottom, as the case may be, at each graduated cutter removing more and more of the wood from above and below the tongue, and from the shoulder, until the last two cutters complete the desired size and shape of the tongue. By this process it will be readily perceived, each cutter having its throat made by the lug against which the preceding cutter rests, the lug is so formed as to make the throat for both cuts of the knife, thereby producing a double shaving, which in its passage out is held together, and is freely discharged from the opened flaring-stock. The lugs also form a series of graduated planes, which guide the board after the cutters have removed the shavings. Each cutter being set in a line with the lug against which it rests, this graduation of a series of cutters in these stocks is made both to cut away from the top and bottom of the board, and also in from the edge, until the required form of the tongue is obtained. To this stock as a guide or gauge for the required distance of the tongue from the top of the board or plank, an iron gauge or straight-edge is bolted to the required point, up against which the board is firmly held while passing by another bar fixed with springs below or on the underside of the board. The stock for forming the groove is also made of iron or other metal. In the forward part of this stock are placed any desired number of jointer-irons, which, with the jointers on the tongue-stock, reduce the board or plank to any desired width. The board by these jointers being made parallel, the board passes a short space on each stock with the line of the board; it then approaches a card of knives fixed to a plate or plates graduated upon lugs or rests, which also not only form a guide to the board, but throats to the cutters. These cutters are alternated, first a V cutter and then a fleam-cutter; the V cutters remove the centre of the shaving, and the fleams the corners, until the desired depth of the groove is obtained. For different-sized grooves, cutters of the required width of groove are used; similar stops or gauges are fixed to this stock as to that for the tongue.

One great advantage is attained by this improvement, that of producing equally as good work on unseasoned lumber as on that which is seasoned, and also lumber can be passed through these matchers at the rate of from one to three hundred lineal feet per minute, and the more rapidly it is passed the better work will be produced; and the cutters being only brought in contact with the planed portion of the board, they will run from twenty to fifty thousand feet of lumber without sharpening, they having already produced that amount of work without sharpening in practical operation; and from their open and unobstructed throats, the shavings are freely discharged without clogging. This difficulty of frequent sharpening and clogging has attended all modes of construction of matchers, where a series of shavings are taken off in close proximity to each other; but it is by this construction entirely obviated; no clogging occurs in the practical operation of these matchers.

The groove-stock is firmly bolted to slide-boxes, which are placed on round rods or slides extending from one side to the other of the frame. A parallel movement is given to those slide boxes by screws worked by gear upon the outside of the frame; by this arrangement the grooves can be adjusted to any desired width of board or plank, &c.

a, a, a, fig. 1, represents the cutters; *q, q, q,* the lug or throat to form the tongue; *e, e, e,* the lower part of the tongue-stock; *b, b, b,* the upper part of the same stock; *c, c,* the spring stop or straight-edge under the board, which keeps the board up to the top guide or guage; *d, d,* the upper-gauge or straight-edge; *f, f, f, f,* jointers in tongue stock; *g, g, g,* the hollow bolt for supporting the springs for lower straight-edge or gauge, and adjusting the same; *h, h, h,* bolts that fasten upper-stops or straight-edge; I, I, springs to lower straight-edge; J, J, J, lugs that receive and support springs to lower guage, and also lugs that receive the upper-guage or straight-edge; K, K, K, are steady-pins or bolts that are firmly fixed into lower straight-edge or guage, and pass through hollow bolts on which the springs rest; L, L, L, are bolts that fix and graduate the upper part of the stock to the lower part; *m, m,* are set screws to adjust the upper-guage or straight-edge; *n, n,* a lug that receives the end of lower-guage or straight-edge; *o, o,* the board; *p, p,* are bolts that fasten the stocks to frame; *r, r, r,* are bolts that fasten cutters to stocks.

Having thus fully described this part of the invention,

what I claim as new, and desire to secure by letters patent, in the above-described matching apparatus, is,

First, the V form of the cutter when used in the flaring-stock, as above described, and for the purposes set forth.

Also, I claim the side graduation of cutters working from the top and bottom of the board substantially, and for the purposes set forth.

Also, I claim the flaring-stock in combination with the V or any other form of cutter, and also in combination with both a side and edge graduation of cutters substantially and for the purposes set forth.

Also, I claim the flaring-stock, the side and edge graduation, and the V cutting knife, combined in one stock for forming the tongue, for which stock all the above claims are made substantially, and for the purposes set forth.—In witness, &c.

EDWARD MAITLAND STAPLEY.

Enrolled January 6, 1853.

Specification of the Patent granted to SAMUEL LUSTY, *of Birmingham, for Improvements in Manufacturing Wire into Woven Fabrics and Pins.*—Sealed June 24, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists,

First, of improvements in the manufacture of wire into woven fabrics; and

Secondly, of improvements in the manufacture of pins. And in order that my invention may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me. The object of my improvement in weaving wire into fabrics is to apply power looms wherein the wire is given off from a beam, by being resisted by a friction band or surface; the wire cloth, as it is made, passing between two pressing rollers, to which a regular and constant motion is given when the loom is at work.

In carrying out this invention, I employ an ordinary construction of power loom, preferring that the shuttles should

have the wire wound on bobbins having there axes across the shuttles; and in order to stop the loom when a warp-wire breaks, I cause each warp-wire to have a weight suspended thereto between the reed and the warp-beam, by which means, in case of a warp-wire breaking, its weight will fall; and in order to prevent the weights going forward with the warps, the eyes or instruments through which the warp-wires pass are stopped by a bar in front against which the eyes rest, and from the eyes, by wires or yarns, the weights are suspended. Below the weights I place a trough across the machine, which, when the loom is at work and all the warps unbroken, is supported by a catch at either end, which on the falling of a weight will be overcome, and the trough will descend, and be the means, either directly of acting on the spring rod (which moves the driving band) to set it free, or else (which I prefer) to interpose a moveable finger in front of the latter, which, in beating up, coming against the moveable frog, as is well understood in weaving other fabrics by power, will let off the spring rod, and the driving strap will be moved from the fast to the loose pulley, and the loom will thereby be stopped.

I would state that power looms for such purposes should also be provided with means for stopping when weft is not thrown across, as are now generally provided in other power-looms. I have not thought it necessary to show any drawings of this loom, as a workman will readily understand this part of my invention from the description above given.

I will now proceed to describe the second part of my invention.

Description of the Drawings.

Fig. 1, is a section.

Fig. 2, a plan.

Fig. 3, a side view.

Fig. 4, a front view.

Fig. 5, a back view.

Fig. 6, a transverse section through 1, 1, in plan, of a machine constructed according to my invention. *a, a,* is the framing; *b,* is the main axis or driving shaft; *c, c,* are fast and loose pulleys, to receive a band or strap from a steam-engine or other prime mover; *d,* is the fly-wheel having a groove upon its periphery, to receive a band to communicate motion to the pointing apparatus, hereinafter more fully explained; the wire is fed into the machine from a

weft, *e*, and is passed between pins, e^1, by which action it is straightened, then through an opening in the spring, f^1, until it arrives beneath the end, f^2, of the slotted lever, *f;* the small cam or projection, *g*, (see figs. 3 and 4,) upon the main axis, *b*, acts upon the slot, f^3, of the lever, *f*, so as to raise and depress the end, f^2, of the lever, *f*, alternately, thereby causing the lever, *f*, to vibrate on a fulcrum, f^5, the end of the wire introduced between the end, f^2, and the spring, f^1, will be firmly held, so long as the cam or projection, *g*, continues to act upon the upper side of the slot, f^3; while the wire is thus gripped, the cam, *h*, on the main shaft or axis, *b*, operates upon the truck, f^4, the lever, *f*, in such a manner as to draw the lever, *f*, and consequently the wire held thereby a distance forward to the dies, *i*, *i*, equal to the length of wire required to form a pin, leaving a sufficient portion of the wire protruding through in front of the dies, *i*, *i*, to form the head of the pin; the dies, *i*, *i*, which are to be according to size of wire to be formed into pins, are affixed to and carried by the slide, *j*, and are fitted in a pair of loose sockets, which admit of adjustment so as to be suitable to receive different sizes and lengths of wire to be formed into pins; they are held slightly apart by a small spring, j^1, attached to the slide, *j*, see fig. 6, which acts upon a pin, j^2, projecting from one of the loose sockets before referred to; j^3, j^4, are set screws for retaining the dies, *i*, *i*, in proper position, the screw, j^3, being passed through a slotted hole in the slide, *j*, to admit of its travelling with its socket by the action of the spring, j^1, which keeps the dies, *i*, *i*, slightly apart until acted upon by the bell crank, k^3, hereinafter explained, which, by its superior power, overcomes the spring, j^1, and closes them. The cam, *k*, also on the axis, *b*, then begins to act on the truck, k^1, so as to cause it and the slide to which it is affixed to travel in its bearings, k^2, (see plan, fig. 2,) and act upon the bell crank lever, k^3, which turns upon an axis, k^4, affixed to the framing, *a*. The other end of the bell-crank lever, k^3, passing into the opening, j^5, (see fig. 6,) so as to cause the plate, *j*, to travel transversely, by which act the length of wire will be cut off. And in order to suit it for cutting a piece of hardened steel, it is let in flush with the face plate of the slide, *j*, and be brought into position to be acted on by the punch, *l*, the truck and slide, k^1, being carried back again by the spring, k^7; the bell crank lever, k^3, is provided

with a set screw, k^6, so as to regulate the extent of motion given to the plate, j. The punch, l, is carried in bearings, l^1, and is moved forward by the cam, l^2, on the main shaft acting on the truck of the slide, l^3, which is provided with an adjusting screw, l^4, and with the punch, l, is caused to travel back again by the action of the springs, l^5, l^6, as shown (see fig. 1); the slide, j, is then carried back to its original position by the action of the spring, j^7. When the lever, f, and spring, f^1, will again be acted upon as before, so as to feed in another length of wire, which fresh length expels the pin which has been cut off by the motion imparted to the slide, j, and headed by the punch, l; and the pin thus expelled drops into the open-mouthed tube, m, fig. 1, which conducts and deposits it in the inclined grooved channel, n, (see fig. 1,) down which it will travel by its own weight until arrested by the stop, n^1, which serves to prevent the possibility of the pins travelling down head foremost, or in too quick succession. By the head coming against the stop, the shank of the pins must necessarily fall into the space or channel formed for them between the two parts, n^5, n^6, composing the channel, n; lower down the inclined grooved channel, n, there is another stop, n^2, which is connected to the stop, n^1, by a lever working on a pin, n^3, projecting from the side of the grooved channel, n. Another lever, n^4, also attached to the pin, n^3, extends down to an incline, o^*, on the upper side of the sliding plate, o^7, by the action of which the stops, n^1, n^2, will be alternately opened and closed, to allow of the passage of the pins along the grooved channel, n, by which they are conducted to the horizontal grooved channel, n^7, (see plan,) to be acted on by the rotary files, q, by which they are pointed. On the main shaft, b, is an eccentric, o, on the rod of which is formed a slot, o^1, through which a projection, o^2, attached to the framing passes, which gives a vibratory motion to the eccentric rod, the lower end of which is connected by a link, o^3, to the bell crank, o^4. The bell crank, o^4, is connected by a pin, p, to the slide, p^1; the pin, p, which connects the bell crank, o^4, with the slide, p^1, passes through a hole, o^6, in the sliding plate, o^7, the hole, o^6, being of sufficient dimensions to allow of a pin, o^5, which connects the sliding plate, o^7, with the bell crank, o^4, to press the plate, o^7, against the pins while they are being operated upon by the rotary files, q, the amount of pressure being regulated by

the set screw, o^8; the plate, o^7, is further provided with a slot, o^9, into which a strip of wood or other suitable material is placed for the purpose of presenting sufficient friction of contact to cause the pins to revolve when being acted upon by the rotary files, q, by which means to produce round smooth points. The slide, p^1, and sliding plate, o^7, it will be seen, have a to and fro motion imparted to them; while moving in a forward direction, the pressure of the edge of the sliding plate, o^7, is upon the pins as explained; but during their retrograde movement the pins are relieved of the pressure of the plate, o^7, and remain for the time being stationary until the next forward action of those parts, and they are similarly acted upon and carried forward until they have travelled to the extent of the horizontal grooved channel, n^7, formed by the bevelled-edged piece, o^9; the sliding plate, o^7, and the bevelled edge formed on the side of the box within which the rotary files or cutters, q, revolve when they fall out of the groove or channel into the spout, and from thence in a finished state into any suitable receiver below.

The rotary files, q, are mounted on an axis, q^1, to which they are firmly held by screwed nuts, as shown by red lines in section at fig. 1, and work in bearings formed in the ends of the casing in which they revolve, and into which casing the portions of pin blanks protrude to be pointed (see transverse section, fig. 6); on one end of the axis, q^1, of the rotary files, q, a pulley, q^2, is keyed, by which motion is communicated to them as follows:—Upon the periphery of the fly-wheel a groove is formed to receive a cord or gut which passes under the pulley, q^3, around the pulley, q^2, on the axis of the rotary files, and returns under the pulley, q^4, to the fly-wheel; the pulleys, q^3, q^4, revolve in a V support attached to the lever, q^5, supported on a pin projecting from the framing, a; q^6, is a weight to give additional pressure to the driving cord or gut.

Having thus described the nature of my invention, and the manner of performing the same, I wish it to be understood that I do not confine myself to the details herein described, so long as the peculiar character of either part of my invention be retained.

But what I claim is,

First, the improvements in weaving wire fabrics herein described; and,

Secondly, I claim the mode herein described of com-

bining or arranging the apparatus herein explained for conducting the portions of wire from the heading process to be acted on by printing apparatus.—In witness, &c.

SAMUEL LUSTY.

Enrolled December 24, 1852.

Specification of the Patent granted to GEORGE FREDERICK PARRATT, *of Piccadilly, for Improvements in Life-Rafts.* —Sealed May 17, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists of making a life-raft capable of being expanded and contracted, which raft when out of use assumes a boat-like form, the construction being such that by reason of its having wings or projecting hollow parts, (composed of air and water-tight materials,) it will when afloat possess large floating powers, and will offer a very extensive area for persons to be carried thereon. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a plan of the raft in its contracted, and

Fig. 2, a plan in its expanded form, and

Fig. 3, shows a plan and edge view of the transverse-bar, which retain the parts in the expanded form. *a, a,* is the central portion of the raft, which is in fact a boat which may be varied in its construction, but I prefer to make it as buoyant as may be, by having as much thereof as conveniently can be hatched or covered in, as is shown at *b, b,* which are hollow water-tight chambers, which should be divided into several compartments, in order that in case one becomes injured the others may remain effective. And such boat or central portion of the raft may be fitted up to receive a mast or masts in order that sails may be used, and there may be a rudder, or the same may be steered by means of an oar; *c,* is a bar which is arranged to move on an axis at c^1, and it lies and is fixed fore and aft in the

centre part of the raft when not in use, as is shown by the drawing.

At each end of the bar, *c*, there are two pulleys through which ropes, *d*, d^1, pass, and which are fixed to the hollow expanding-wings or projections, and by which the wings are retained in their places when expanded, as shown by the drawing. *e*, *e*, are the wings or projections, which are to be buoyant, and I prefer them to be of strong waterproof material, covered with strong netting or otherwise strengthened or protected, and the material I have used is what is called vulcanized India-rubber, and each of the wings or projections may consist of one hollow chamber or of several compartments, and by suitable valves and pipes or ways they may be inflated by the same or by different air-pumps, as will readily be understood by persons acquainted with making air-tight flexible apparatus for other purposes. When the raft is out of use the projections or wings are empty or nearly so, and are lashed to the sides of the boat or centre portion of the apparatus, as is shown. *f*, *f*, are nettings, which add to the extent of area offered by the other parts of the raft for receiving persons. When about to be used the lashings are to be removed, or if required in haste, may be cut away. The most convenient mode of using the raft will be to lower it into the water before expanding the wings or projections, and to bring the raft under to the stern of the ship or vessel, then to move and fix the bar, *c*, across the boat or centre part of the apparatus, and by means of the ropes to expand the wings, and the nettings then by the air-pump or pumps to fill the buoyant vessels. The raft will then be in a condition for receiving passengers and the crew, and will offer a very extensive buoyant area for that purpose.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details herein shown and described, as the same may be varied without departing from my invention.

But what I claim is the mode herein described of combining parts into a raft.—In witness, &c.

GEORGE FREDERICK PARRATT.

Enrolled November 17, 1852.

Specification of the Patent granted to JOSEPH HART MORTIMER, *of Hill-street, Peckham, in the County of Surrey, for Improvements in Lamps.*—Sealed June 24, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention has for its object,

First, improvements in lamps used for burning solid tallow or fat, which if moulded is not provided with a wick, and the same is consumed by means of a short wick applied to a suitable holder, and these improvements consist in arranging the parts that the wick may be carried by a non-conducting or slowly conducting matter in place of metal, which has heretofore been employed in such lamps; and

Secondly, my invention consists of the application of a float to lamps suitable for burning tallow and other fatty matters where the same has to be melted, and kept melted by the burning of the materials. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows the section of so much of a lamp for burning moulded lumps of tallow or fat without wicks, which description of lamps have before been made, but I believe not with any degree of success, and I am induced from my experiments to think that the failure has been by reason of the instrument which has been used to carry the wick, being of metal and in connexion with the nozel, by which the great heat of the burning wick has been readily transmitted to the fatty matter below the wick-holder, and the peculiarity of this part of my invention consists of forming the wick-holder of a non-conducting or slow-conducting material, so as to intercept the heat of the burning wick from the fatty matter below. *a*, is the nozel, having projections, *b*, for the wick-holder; *c*, is the wick-holder, which I prefer to be of wood with metal points, as shown by this arrangement; the holder of the wick is not in metallic connexion with the nozel, and the heat of the

wick is partially, as it were, cut off from the fatty matter below.

I would remark that the form of the wick-holder and the means of connecting it with the nozel may be varied, so long as non-conducting material is interposed.

Fig. 2, shows a section of a lamp for burning tallow or fatty matters which require to be melted and kept melted when burning; *e*, is the vessel to receive fatty matter which is to be melted and poured through the strainer, *f*, which has a cover, *g*, with an air-hole in it. When in use the heat of the lamp keeps the matter melted and a constant supply passes down the tube, *h*, to the vessel, *i*, wherein there is a float, *j*, to which is fixed a valve, as shown; this float prevents too large a supply coming down from above and regulates the level at which the melted fatty matter shall stand. And it will readily be understood that so soon as the proper level of fatty matter is arrived at the valve will be closed by the float, and as the matter is consumed the float will descend and a quantity will flow in, and thus will a constant regulation be obtained.

Fig. 3, shows the section of another lamp which differs from that above described in having the float and float-vessel closed within the other vessel of the lamp, the parts, however, act in the same manner to what has been just described.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details herein described, so long as the peculiar character of any part of my invention be retained.

But what I claim is,

First, the improvements herein described in lamps where the wicks are carried by the nozels, as herein explained; and,

Secondly, I claim the applying floats in constructing lamps for burning tallow or fatty matters which require to be kept fluid by the heat of the lamp.—In witness, &c.

JOSEPH HART MORTIMER.

Enrolled December 24, 1852.

Specification of the Patent granted to JOSEPH LEESE, *the younger, of Manchester, in the County Palatine of Lancaster, Calico Printer, for An Improved System of Preparing, Cutting, and Engraving Rollers to be used for Printing Woven and other Fabrics, and Improved Machinery for Printing and Washing the same Fabrics.*—Sealed May 29, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists,

First, of an improved system of preparing, cutting, and engraving rollers to be used for printing woven and other fabrics. Heretofore, in printing woven fabrics, paper-hangings, and other surfaces, it has been usual amongst other means to employ rollers with raised surfaces, called "surface roller printing," in which cases the rollers have been commonly of wood, with or without parts of the surface or pattern produced by affixing metal cast to the form of the parts of the design, which are to be printed thereby. Now, the object of the first part of my invention is to produce rollers of metal suitable for surface printing, and in inlaying felt or other suitable flexible material in those parts of the surface which are to be printed from, by which means more exact register of the different colours of a pattern is obtained, and generally more complete work is produced.

In carrying out this part of my invention I prefer to employ copper-rollers, and having sketched or transferred a design on to the surface of such a roller, I proceed to remove the intermediate metal by any suitable cutting instrument, so that the parts of the surface which are to be printed from are left in sufficient relief, or in place of cutting away the metal, the same may be removed by acid, taking care to cover the parts to be kept in relief with matter which will not be acted on by the acid, as is well understood. I, however, prefer to cut away the metal which in many patterns may be roughly done by mounting the roller in a lathe, and causing it to turn slowly, so that the workman may withdraw the cutting-tool, when a part which is desired to be left raised or in relief comes near thereto, and after having thus roughly cut the roller the cutting

near the pattern may be done by the workman by hand. By this or such like means a metal-roller will be obtained, leaving the design to be printed from in relief, but as the smooth metal surfaces would not be suitable for receiving the colour and reprinting it on to a fabric, I cause the surface in relief to be properly prepared to receive and apply colour, and I do this by hollowing out all the parts to be printed from, leaving marginal walls all round the edges of the pattern or design, and into these hollows I introduce felt or other suitable porous matter; and the best mode I am acquainted with for accomplishing this object is to spread gutta percha over one side of a piece of felt, and then to warm the roller, and to press pieces of the coated felt of the form of the cavities or hollows into them, the warmth of the rollers causing the gutta percha to adhere thereto, and I remove any portion of the felt which may protrude out beyond the true circumference of the roller, by means of a sharp knife; the roller will then be in a condition suitable for use.

I will now describe the second part of my invention, which consists of the employment of small metal rings or short cylinders, Nos. 2 and 3, instead of one complete cylinder, as is now commonly practised. The several rings or cylinders are placed on to a spindle or mandril running through them, and are fixed thereon by keys or screws or otherwise, and intermediate rings or washers are used to keep the parts of a roller at the required distances apart, (see fig. 1,) or in place of complete rings or short cylinders, pieces of copper cast in such parts of a circle, as will include so much of the pattern as may be required, can be used. These would also be keyed, screwed, or otherwise fixed on the mandril or spindle, or kept apart by washers, as described.

Fig. 1, shows a roller composed. *a*, being the mandril or axis; *b*, *b*, the engraved rings; *c*, *c*, the washers; and *d*, shows a casting when only part of a cylinder or ring is used.

I will now describe the third part of my invention, which consists of a new form of printing machine wherein a rapid tremulous motion is given to the roller itself, or to the apparatus which furnishes it with colour, or to the bed against which the roller presses when printing. (See figs. 2 and 3.) 1 and 2, are cylinders; 4, is an endless-band or blanket; 10, 10, are two rollers intended to keep the

blanket straight with the printing-roller; 11, is the engraved surface-roller; 3, 3, are guide-pulleys or rollers to cause the blanket or endless-band to run true; 8, is a rod having attached to its end near the blanket or endless-band a piece of iron or a small roller; the other end of the rod, 8, is attached to and driven by an eccentric, 7, by which a quick tremulous or vibratory motion is given to the rod, 8; this tremulous or vibratory motion may be obtained by other means than that of the eccentric, but the eccentric is preferred; 14, is an ordinary endless-sieve to supply the surface of the engraved-roller, 11, with colour; 12, 12, 12, 12, are rollers which carry the colour-sieve; 13, 13, are guide-pulleys or rollers to cause the endless colour-sieve to run true; 18 and 19, are the colour-box and rollers to supply colour to the endless-sieve; 16, is a rod of iron having attached to its end near the colour-sieve a piece of iron or a small roller, the other end of the rod, 16, is attached to and driven by an eccentric, 15, by which a quick tremulous or vibratory motion is given to the rod, 16; but this tremulous or vibratory motion may be obtained by other means. This machine is driven in like manner to that in which surface machines are now worked.

In the drawings the apparatus for one colour only is shown, but if the machine be required to print more than one colour, like apparatus as above described is to be repeated.

In working the machine, the piece, 6, to be printed is brought over the roller, 5, on to the blanket or endless-band, 4, under the cylinder, 2, and it is thus brought into contact with the engraved surface-roller, 11, and becomes in the working of the machine subjected to the action of the rod, 8, having the tremulous or vibratory motion, as before described, and thus the piece is printed; after being printed the piece is conducted over the cylinder, 1, to be dried in the ordinary way. The colour is supplied to the colour-sieve, 14, as is now commonly done, and the sieve is made to communicate its colour to the engraved surface-roller by being pressed against it, by means of the vibratory or tremulous motion of the rod, 16. The piece, 6, and the blanket are pressed against the engraved surface-roller, 11, by means of the vibratory or tremulous motion given to the rod, 8.

This part of my invention also consists of the application of small rollers or pulleys, 3, 3, to guide the blanket

straight over the cylinders, 1 and 2, also of the application of small rollers or pulleys, 13, 13, to guide the colour-sieve, 14, 14, over the rollers, 12, 12.

I will now describe the fourth part of my invention, which has for its object the transferring of a pattern drawn or produced on paper or other flexible surface on to a roller; this is accomplished as follows:—I paint on paper or other suitable surface with a pencil-brush the pattern or design to be transferred to the roller to be engraved with a varnish capable of resisting the action of the nitric acid; the varnish commonly used by engravers I have found to answer the purpose; then take the paper or other suitable surface so painted and place it on the roller, pressing and rubbing it on the surface of the roller, so as that the varnish shall thus be communicated to it, the varnish being thus transferred from the paper or other suitable surface to the roller, the roller is to be immersed in nitric acid and thus engraved.

Or I take an impression on paper or other suitable surface with varnish, as before described, from any suitable printing surface having thereon the desired pattern, and I transfer the varnish of the impression from the said paper or other suitable surface to the roller to be engraved as before described.

Or I cover the surface of the paper or other flexible material used with a thin film of varnish, and then paint on it the pattern to be engraved with a pencil-brush, or produce it by taking an impression from an engraved or other printing surface, with a composition which will act as a cover to such parts of the varnish as it falls upon, and thus prevent the varnish in such covered parts from adhering to the roller when pressed upon it. The composition used for this purpose may be made of many kinds of materials, but I have found that a mixture of ground chalk and gum senegal is very suitable.

Or, take a paper or other surface, produce upon it in the same methods, as before described, the pattern to be engraved; but in this case I use the composition of ground chalk and gum or other materials, then transfer this to the roller to be engraved in the same manner as has been before described, and then immerse the roller in the varnish, which is commonly used by engravers to resist the action of nitric acid; then remove the composition which had been transferred to the roller and submit it to the acid to

be engraved. In thus transferring designs from paper or other surface on to metal-rollers I cause the rollers to be warm in order to melt the composition employed, and thus to facilitate the transfer; also, when from the nature of the pattern or design to be transferred the varnish used, as before described, adheres too closely to the paper or other suitable surface used in the transfer, in such cases I prepare the said paper or other suitable surface with a fine coating or film of soap or gum, or other material which will permit the varnish more readily to detach itself when pressed against the surface to be engraved. Heretofore, it has been usual when one or more colours are to be printed to produce a pattern, to sketch the pattern on one roller, and to etch or engrave the whole pattern thereon, and to take off as many impressions as there are rollers required for the several colours; I prefer to avoid the etching or engraving the whole pattern, in place thereof I draw or obtain the outline pattern on to lithographic stone or zinc, and take as many impressions as there are rollers, and use them as those heretofore when they have been obtained by etching or engraving one of the rollers.

The fifth part of my invention consists of employing a mandril of less diameter than the interior of the hollow rollers which is to be used in a printing machine, and fixing such roller to the mandril in such manner that it shall be perfectly true to its centre. A form of mandril by which this can be done is shown in drawing, fig. 4.

1, is the mandril, being a circular bar of iron; 2, 2, are rings of iron having a slit in them; 3, 3, 3, 3, are screws which screw into the rings of iron when the roller is to be mounted upon this mandril; the screws, 3, 3, 3, 3, are unscrewed so as to come in contact with the interior of the roller until they hold it firmly, and the roller is set true to the mandril by raising or lowering the screws, as may be required. I am aware that a mandril similar to the one here described is used by engravers, but has never before been used to mount rollers upon when the rollers are used in the printing machine.

I would remark that in place of using these screws wedges may be forced in between the interior of the roller and the mandril or axis, either by screws or otherwise, the wedges being parts of a cone as have heretofore been used by engravers of rollers.

The sixth part of my invention consists of a washing

machine formed of a series of rollers and cisterns arranged as in fig. 5. 3, 3, 3, are cisterns; 2, 2, 2, are rollers; 1, 1, 1, are pipes to convey water, and are perforated with a series of apertures through which the water escapes in jets; 4, 4, 4, are pipes to convey the water out of the cisterns to pumps, which lift the water to such elevation as may be required, and convey it to the pipes, 1, 1, 1, as there is a pump provided for each cistern; the water is constantly taken from and returned to the same cistern; the object of this is that as the water supplied to the washing machines enters at one end and is intended to pass through the cistern and escape at the other, the water in the separate cistern may not be mixed; when the machine is used for washing, the piece, 5, enters at the end of the machine at which the water overflows; it passes through the series of cisterns over the rollers and leaves the machine at the end where the clean water is made to enter in its passage through the cisterns, the jets of water from the pipes, 1, 1, 1, play upon it. The machine is driven by a shaft and pairs of bevel-wheels, as in drawing.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details herein shown and described, so long as the peculiar character of any part of my invention be retained.

But what I claim is,

First, the construction and application of metal-rollers for surface printing herein described.

Secondly, I claim the construction and application of rings or parts of rollers for printing as herein explained.

Thirdly, I claim the improvements in printing machinery herein described.

Fourthly, I claim the means of obtaining patterns on metal-rollers used for printing by transferring as herein explained.

Fifthly, I claim the application of the means of fixing printing-rollers on to their axes or mandrils when used in printing machines; and,

Sixthly, I claim the combination of parts in constructing a machine for washing as herein explained.—In witness, &c.

JOSEPH LEESE.

Enrolled November 29, 1852.

Specification of the Patent granted to JOHN MOORE, *of Arthur's Town, in the County of Wexford, Ireland, for Improvements in Nautical Instruments applicable for Ascertaining and Indicating the true Spherical Course and Distance between Port and Port.*—Sealed May 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My instruments consist of two graduated brass rings or meridians, which are so connected together that they may be set at any required angle to each other by means of the divisions marked on a third ring placed equatorially to the two meridian rings, and on which they slide. On the skeleton globe thus constructed a fourth graduated brass ring can be clamped in any position, being a great circle to the said globe. And in order that my invention may be most fully understood, and readily carried into effect, I will proceed to describe the drawings.

Description of the Drawings.

Fig. 1, represents a side view of the apparatus as arranged for ascertaining and indicating the true spherical course and distance between port and port. A, B, are two meridian rings, the ring, A, which is fixed in the foot, I call the standing meridian; and the ring, B, the moveable meridian, they are shown alone in figs. 2, 3, 4, and 5.

Fig. 2, showing a plan view of the ring, A; and

Fig. 3, a section through the poles.

Fig. 4, a plan of the ring, B.

Fig. 5, an edge view looking in a line with the poles. The sides of the rings, A and B, opposite to those shown in figs. 2 and 4, are not graduated, but there is a small groove for a binding-screw to enter, as is shown in fig. 3 at *a;* the section of the ring, B, is like that of the ring, A, and it fits on to the equatorial ring in the same manner as that ring, and as is shown in figs. 2 and 3. C, fig. 1, shows the equatorial ring, of which fig. 6, is a plan of the side, which is graduated to degrees; and fig. 7, is a section. D, fig. 1, shows the great circle which is clamped into the meridian, it is shown in plan in fig. 8, and an edge view is shown at fig. 9.

It will be understood that although the rings are shown in the drawing graduated only every ten degrees, it will be necessary to graduate them in practice to the quarter of a degree or finer. *b*, b^1, and *c*, c^1, show the screws and nuts which connect together the rings, A and B, in such a manner that they can move freely on them as centres when the nuts are not screwed down on the ring, B; *d*, d^1, show two clamps which clamp the meridian, A, to the equator, C, when the screws, *e*, *e*, e^1, e^1, are screwed up; E and F, are two discs of metal which are clamped on to the standing meridian, they are shown alone at figs. 10, 11, and 12.

Fig. 10, showing a plan view with the graduations.

Fig. 11, is a vertical section; and,

Fig. 12, is a view of the underside.

The outer compass, *f*, shown in fig. 10, is fixed, but the inner one, *g*, is moveable round its centre; *h*, shows the screw which clamps the instrument on to the standing meridian, it is turned by a key similar to a watch-key; *i*, i^1, are two small springs which hold the instrument on to the meridian when the screw is not screwed up; *k*, is a hole in the centre into which the screw-pins, *l*, l^1, of the great circle, D, fall.

The compass, G, which is shown in figs. 13, 14, and 15, is similar to the other two, with the exception that in place of the hole, *k*, in the centre, there is placed a pivot in such a manner that it can turn freely on its centre, and it is notched so as to fit and slide on the great circle. *l*, l^1, are the screw-pins of the great circle, they are placed opposite to each other and can be turned by a key, so as to be caused to project more or less as is required; H, is the foot in which the instrument is fixed by means of the binding-screw, H^1, which fastens it as in a vice, the jaws being lined with cork or other yielding material; I, is the arm carrying the clamp which fixes the great circle in any required position, it slides through the foot and is fastened in any part of its course by the screw, K. The double fork, L, slides in a hole perpendicular to this arm, and is fastened by the screw, M, and thus clamps the ring in any required position.

I will now proceed to describe the manner in which this instrument should be used to find the angle of position or bearing, and also the areal or true distance of any place from any other place:—Set the standing meridian to the

longitude on the equator (either east or west) of one of the places and clamp it with the clamps, *d*, d^1. Fix by means of its screw one of the compasses with the centre hole on this meridian at the latitude of the same place, and fix on in the same way the other compass (with the hole) at the antipodes on the opposite meridian. Fix the compass with the pivot on one or other of the moveable meridians, according as the longitude of the second place is east or west, and at its latitude. Fix the same meridian at the longitude of the second place on the equator and clamp by screwing up the nuts, c^1, at the poles, now place the great circle on the instrument, the pin at 180 degrees into the hole in the compass at the antipodes, its arc into the pivot of the moveable compass, and screw its screw at 0 degree into the compass on the standing meridian. The arc between the compasses (representing the places) will then show on the compasses the angles of position or bearing at either place, both true and magnetic, the inner compasses being previously set to differ from the outer ones by the amount of the variation, and the pivot in the moveable compass will indicate on the great circle the arcal or true distance between the places. And now to find the line of course and the corresponding latitudes and longitudes to be passed on transit between these two places—fix the great circle by means of the clamp, L, then loose the nuts, *c*, c^1, at the poles, and also the screw, *h*, of the moveable compass, which compass move along the line of track, and it will show at each point in the track as the moveable meridian changes its position the true and magnetic course the arcal distance passed over and to be passed, also the latitude on the moveable meridian, which meridian will indicate on the equator the corresponding longitude to be passed at the same place.

I would remark that the moveable compass, G, should always be first set to the place of departure, and the instrument will then show the true course until the compasses come in contact, when the instrument must be reversed, that is to say, the moveable compass must be set to the place of arrival, and *vice versâ*, by which means the track can be carried out.

Fig. 16, shows a section view of the instrument as arranged for use in the box which contains the ring, N, as shown, representing the true horizon; and,

Fig. 17, shows a plan of the box and ring. It consists of the instrument, as before described, disconnected from the foot and without the great circle, the other side of the equatorial ring is uppermost, and this side is graduated to parts of twenty-four hours and minutes of time in the direction of the movement of the hands of a watch, as is well understood, and also the semicircle or double quadrant, O, which is shown in plan at fig. 18, and at side view at fig. 19.

The horizon ring has four screws, *m*, *m*, *m*, *m*, for adjustment, as shown in plan. The double quadrant has a screw-pivot in the centre of the arc, similar to those in the great circle ring, D. The box contains three adjustable metal slides or grooves, *n*, *n*, *n*, inlaid with cork or similar substance to hold the standing meridian at right angles to the horizon ring; in the lower one a binding-screw is placed to secure the standing meridian when necessary.

Fig. 20, shows a marker or pointer which can be clamped on to the rings at any required place.

I will now proceed to describe the means of using this instrument to find the latitude, the amplitude, the azimuth, and by consequence the variation of the compass, the time, and then by consequence the longitude.

Set the equatorial ring with twelve o'clock coinciding with the standing and the opposite meridian.

To find the latitude by meridian altitude elevate the pole to the supposed latitude; place a compass (with a hole in it) on the standing meridian loosely; place the double quadrant with its pivot in the hole of the compass, bring the altitude observed marked on the quadrant with one of the pointers to coincide with the reduced declination marked by a pointer on the standing meridian, then will the latitude be indicated by the compass at the zenith or the pole will be elevated to the amount of the latitude on the opposite meridian.

To find the latitude by double altitude proceed by placing the instrument as before, having first marked the quadrant with the two observed altitudes; place the moveable meridian to the equator at the time noted of the first observation, bring the two observed altitudes (marked on the quadrant) in succession to coincide with the reduced declination (marked on the moveable meridian) when the moveable meridian is moved to the amount of the elapsed

time between the two observations, and when all have been brought to coincide by movement of the instrument, the result will be indicated as in the first case.

Note.—The following must be attended to as regards both the above problems.

If the altitude be north and declination north, the latitude will be south, (the elevated pole coinciding,) and *vice versâ*, unless the observer be between the sun or other body and equator, in which case the result is opposite, but if the altitude be north and declination south, or *vice versâ*, the elevated pole and latitude will coincide with the name of the declination.

To find the amplitude and time corresponding elevate the pole to the known latitude on the opposite meridian. The declination on the moveable meridian if brought to the horizon will cut it at the degree of amplitude from north or south of the same name as the declination, and the apparent time corresponding will be shown on the equator by the inside line or indicator of the same moveable meridian.

To find the azimuth time and variation of the compass elevate the pole as above, place the compass on the zenith, also the quadrant on the compass, on the quadrant mark the altitude, and bring it to coincide with the reduced declination on the moveable meridian, its lower points or legs will cut the horizon at the degree of azimuth from the north or south, the moveable meridian showing on the equator the apparent time, to which apply the equation, and the result will give the difference of longitude in time, if Greenwich mean time be observed, when the altitude was taken; bring the magnetic bearings by the inner compass (if observed also when the altitude was taken) under the line of arc of the quadrant as placed, the difference between the inner and outer compasses will be the magnetic variation by azimuth compass.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I do not confine myself to the several details herein described, so long as the peculiar character of my invention be retained, as variations may be made without departing from my invention.

But what I claim is,

The mode herein described of the combining parts into

instruments applicable in resolving nautical problems as herein explained.—In witness, &c.

JOHN MOORE.

Enrolled November 1, 1852.

Specification of the Patent granted to LAZARE FRANÇOIS VAUDELIN, *of Upper Charlotte-street, Fitzroy-square, for Improvements in Obtaining Wool, Silk, and Cotton from old Fabrics in a condition to be again used.*—Sealed June 30, 1852.—(Partly communicated.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention consists of passing the old woollen and other fabrics whilst in water between a cylinder and a flat plate or other form of surface armed with teeth or points, by which the fabric is torn to pieces, and the fibre brought to a state to be again manufactured. Heretofore, old fabrics have been extensively torn to pieces and the fibre obtained has been again spun and used in the manufacture of other fabrics, but by reason of the process having been performed in the dry state, the fibres have not been so readily separated, but have become much more injured and broken than when working, according to the present invention, by which the pieces of fabrics which are being acted on are constantly in water, and by which the fibres are more readily separated, and at the same time the fibres will be thoroughly cleansed. The old fabrics, whether of wool or other fibre having been washed, if they require it, are cut into pieces, say from about two to eight inches square.

The machinery used is very similar to what is used by paper-makers, which, however, I prefer to be constructed with two beating-wheels.

Description of the Drawing.

Fig. 1, is a plan.

Fig. 2, a longitudinal section; and,

Fig. 3, part of the spiked plate, full size. *a*, *a*, the beaters, having straight blades of metal, *b*, with plain

edges; I have however, in some cases, such as for tearing silk, cotton, and mixed rags, used the beating-blades, *b*, with notched edges.

When beating silk or cotton rags I have found it desirable to place behind each cylinder with pointed plates a bar or comb, with points to hook off the silk or cotton, so as to prevent its closing the machine.

The beating-wheels, *a*, *a*, have each a cover or guard to prevent the splashing over of the water, and each of the beating-wheels has a fall or incline, as shown at *c*, and a plate of metal with teeth, which I prefer to be of the form shown at fig. 3, which is full size, for fabrics made of wool; but for silk, cotton, or mixed rags, I use a plate of metal with points or teeth of smaller dimensions, about one-half.

The machine is arranged for the axes of the beating-cylinder to be raised and lowered by screws, as is well understood, but not shown in the drawing. Water constantly flows into the cistern of the machine at *d*, and flows off constantly through the perforated surfaces, *e*, and away at *f*.

It is found that for silk fabrics the work goes on better if the water be at about ninety degrees of Fahrenheit, and a smaller quantity of soft soap may be advantageously employed in the water. At starting the beating-cylinders are nearly down to the fixed teeth, and are to be progressively raised as the disintegration or separation of the fibre proceeds, till the complete separation or unweaving and untwisting has been accomplished.

Having thus described the nature of the invention, and the best manner of performing the same, with which I am acquainted, I would wish it to be understood that I do not confine myself to the details herein shown and described, as the same may be varied, so long as the peculiar character of the invention, that of treating old fabrics in water, so as to separate the fibres into a state to be again used with other fibres in the manufacture of fabrics by spinning and weaving, be retained.—In witness, &c.

Lazare François Vaudelin.

Enrolled December 30, 1852.

Specification of the Patent granted to Moses Poole, *of the Patent Office, London, Gentleman, for Improvements in Covering Wires for Telegraphic Purposes.*—Sealed April 6, 1852.—Communication.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists,

First, of employing flexible varnish on wire before coating it with insulating materials.

Secondly, the invention consists of applying coatings and successive coatings of gutta percha, or india-rubber, or of gutta percha and india-rubber; and

Thirdly, the invention consists of constructing apparatus suitably arranged for applying two or more coatings simultaneously as the wire passes through the apparatus.

And in order that the invention may be most fully understood, and readily carried into effect, I will proceed to describe the means of working as communicated to me.

The flexible varnish which is first applied to the wire I prefer to be pitch or other bitumen; and in order to coat the wire therewith, when for a preparatory coating, before applying gutta percha or india-rubber, or mixtures of these materials, I cause the wire to be drawn through a trough containing melted bitumen, at such a distance from the covering apparatus that the bituminous varnish may be set before it comes to the other covering apparatus; or in place of using pitch or bitumen alone, india-rubber or gutta percha can be combined therewith by masticating the two together with or without heat, and for this purpose a good compound is at about the rate of four parts by weight of pitch or other hard bitumen to one of india-rubber or gutta percha, or of the two combined; and the use of india-rubber or gutta percha with bitumen for coating wire for telegraphic purpose is far better than the use of bitumen; this compound, though it may be used in a comparatively fluid state by employing heat to that extent, it is better to spread it on to the wire in a plastic state from a masticating or kneading machine; and this is most readily accomplished by means of dies, such as are ordinarily employed for coating wire with gutta percha, or such as hereafter explained.

Description of the Drawings.

Fig. 1, shows a side view; and

Fig. 2, a plan of apparatus arranged for covering telegraphic wire with a ribbon or fillet of india-rubber. *a*, is a pulley turning freely on the hollow axis, *b;* motion is communicated to the pulley, *a*, from a steam-engine or other motive power; a^1, is another pulley also turning freely on the hollow axis, *b*, and the pulley, a^1, receives motion by the pulley, *a*, being brought in contact with it by the forked lever, *c*, there being a friction cone on the side of the pulley, a^1, which enters into a corresponding hollow cone on the side of the pulley, *a ;* a^2, is a disc affixed to the side of the pulley, a^1, which carries a bobbin, *d*, on which the india-rubber is wound; the axis on which the bobbin, *d*, revolves is attached to the side of the disc, a^2, by a joint, d^1, so as to be capable of fixing the bobbin at an angle to the wire; and there is a spring, d^2, against which one end of the bobbin is pressed by the nut, d^3, on the other side of the axis of the bobbin to obtain friction to it, in order that the india-rubber may be given off in a distended state, motion being given to the pulley, *a*, and by it to the pulley, a^1, and disc, a^2*;* the bobbin, *d*, is caused to revolve round the wire as it passes through the hollow axis, and a band or fillet of india-rubber is thus wound spirally around it. The wire is drawn off the reel, *e*, through the hollow axis, *b*, in the following manner: — an endless band around the pulley, n^1, gives motion to the pulley, f^1, on the axis, *f*, caused by bearings on the side framing of the machine; the worm, f^2, on the axis, *f*, gives motion to the worm-wheel, g^1, on the axis, *g*, supported in bearings on the main framing, as shown; g^2, is a pulley on the axis, *g*, around which the wire as it is covered takes one turn, and is from thence taken and wound upon the wheel or bobbin, h^1, on the axis, *h*, having motion communicated to it by an endless band around the pulleys, h^1, h^2, and g^3, all which will be readily understood on examining the drawings. The wire, as it leaves the reel, *e*, passes between the fixed studs, e^1, and any bends or irregularities are by that means taken out, and it passes through the hollow axis in a straightened condition ready to be covered.

When two or more coverings of india-rubber to the wire are required, I cause the wire as it receives one covering to pass through another hollow axis, and in its passage it may

receive a coating of a solution of india-rubber, or solvent of india-rubber, so as to unite the next ribbon or fillet (which is wound over it in a similar manner to the first) closely over the previous one; the wire thus covered may be afterwards coated or covered with gutta percha or other material, as is well understood.

I would here remark that, although I have mentioned the band or fillet to be india-rubber, gutta percha or mixtures of these materials may be used, or in addition thereto bitumen above described.

It is found that telegraphic wire covered with gutta percha alone, after long exposure to the atmosphere or to the earth, undergoes considerable change, and its power to insulate becomes less perfect: this is obviated by combining india-rubber in the proportion of one-sixth to five-sixths of gutta percha or thereabouts; the power of insulation will be maintained more perfect under such circumstances, notwithstanding its exposure to the atmosphere or moisture to which it may be subjected, and this compound will be found more durable than gutta percha alone. And I would wish it to be understood, that one part of the invention consists in covering telegraphic wire with a compound of gutta percha and india-rubber, not confining the invention to the exact proportion above stated; and I would state that it may be desirable in some cases to cover telegraphic wire with the compound of india-rubber and gutta percha alone, and in other cases it may be desirable to first cover the wire with india-rubber, as before explained, and afterwards to cover it with the compound of india-rubber and gutta percha.

I will now describe the third part of the invention, which has for its object the construction and employment of apparatus for covering wires having two or more dies, that a wire in passing may receive successive coats of the covering material.

Fig. 3, shows a section of apparatus having three dies, *a*, *b*, *c*, similar to the single dies or orifices hereinbefore employed for such purposes; *d*, is the opening into which the gutta percha or other covering material is forced in a plastic state; the wire passes through the guide, *e*, as is shown, and it first becomes covered with a thin coating at *a*, then another coating is applied at *b*, and another at *c*; and in order to prevent the joins of the successive coatings coming opposite each other, the supports, *f*, of the succes-

sive dies or moulding orifices should not be placed in a line or opposite each other. In like manner may apparatus be made with two dies, or with more than three dies.

It should be remarked, that the apparatus shown is suitable for covering only with the same material at the different openings or dies; but it will be evident that successive coatings may be laid on one or the other by causing the material to be forced into separate compartments in communication respectively with the several dies.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would have it understood that what I claim is,

First, the coating of wire with a flexible varnish of bitumen, and then applying gutta percha or other insulating materials herein described; and also the combining india-rubber or gutta percha in combination with bitumen as a flexible varnish or coating.

Secondly, I claim the mode herein described of applying coatings, and successive coatings, of gutta percha or india-rubber, and of gutta percha and india-rubber; and

Thirdly, I claim the construction and use of apparatus for employing two or more moulding dies or orifices, to obtain successive coatings to wire.—In witness, &c.

MOSES POOLE.

Enrolled October 6, 1852.

Specification of the Patent granted to ROBERT GRIFFITHS, *of Clifton, Engineer, for Apparatus for Improving and Restoring Human Hair.*—Sealed October 20, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists of constructing combs, brushes, or such like instruments for combing and brushing the hair, that when in use and passed through the hair, electric currents may be given off, and thereby the skin caused to be stimulated and a healthy action produced, which will have the effect of restoring colour to the hair, and generally to improve its appearance. Combs and brushes may either be made of different metals, so as to become a battery in

themselves, or they may be of metal or partly of metal, and have batteries connected therewith when in use, and the arrangement of the parts may be greatly varied; but the arrangement shown by the drawing will, I believe, be found as convenient as may be for the purpose. I do not, however, confine myself to the arrangement shown, so long as combs or brushes, or such like instruments, are made suitable for carrying out my invention.

Description of the Drawing.

Fig. 1, shows a comb made according to my invention.

Fig. 2, is a longitudinal section thereof; and

Fig. 3, is a transverse section thereof.

The teeth are alternately of copper and zinc, or other metals suitable for composing a galvanic battery, and they are connected together by a wire run on a wire, *a*, there being a metal washer between each neighbouring pair of teeth; *b*, is a hollow back fixed on the upper parts of the teeth; *c*, is a wire on which is to be wound worsted or other fibre, and when intended to be used, such wire with its covering is to be dipped into a solution of common salt, or very dilute acid, or other fluid suitable for producing action on the metals. The wire with its covering is then to be slided into its case, and the effect of the arrangement will be that when the comb is passed through the hair, the moisture on the skin and in the hair will sufficiently make up a complete electric circuit to cause currents of electricity to pass through the teeth and through the fluids in the hair, and thus produce the desired effect; or in place of making the comb so as to contain or be its own battery, it may simply consist of a series of metallic points in connexion with a separate battery; but I prefer the arrangement above given, but do not confine myself to the form of the parts.

Fig. 4, shows an edge view; and

Fig. 5, a transverse section of a brush made according to my invention, the points being made of very fine metal wire set in india-rubber or other elastic substance, which may also have a hollow back for air. And the upper part of the back is also made hollow to contain a battery, which I prefer to construct as follows:—*d*, *d*, are two plates of zinc having between them two surfaces of woollen cloth saturated, when in use, with a solution of common salt or

other suitable fluid; *e*, *e*, are two plates of copper, also having surfaces of saturated cloth between them; these two pairs of plates are put in metallic connexion with the teeth by means of two plates, *f*, *g*, by which arrangement, when the brush is passing through the hair, the fluids on the skin and in the hair will sufficiently close the circuit, and currents of electricity will pass through the fluids and the teeth of the brush, so as to produce the desired result.

Figs. 6 and 7, show a side view and section of another arrangement of brush, in which case a similar battery is applied in the back, as shown, and each of the two pairs of plates is to be in suitable metallic connexion with two or more rows of wire, *h*, *i*, so that when in use circuits will be closed or made complete by the fluids on the skin and in the hair, so that electric currents will pass between the points, *h* and *i*; the other parts of the brush in this case are intended to be of bristles, and wires, *h*, *i*, are intended to be very fine, though shown coarse in the drawing. I would state that here, as in the case of the combs, the instrument itself may be separate from the battery; but I prefer that the whole should be combined with one instrument, as shown, though the arrangement and form of the parts may be varied, and other metals may be used, in making the batteries.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is, the arranging or combining parts into combs or brushes, or such like instruments suitable for passing through the hair or against the skin, and so that electric currents may be obtained when in use, as herein explained.—In witness, &c.

ROBERT GRIFFITHS.

Enrolled October 20, 1852.

Specification of the Patent granted to WILLIAM TANNER, *of Exeter, Leather Dresser, for Improvements in Dressing Leather*.—Sealed July 6, 1852.

To all to whom these presents shall come, &c., &c.— My invention consists of combining the use of blubber with

cod-liver oil (in place of using that oil alone), and thereby materially to decrease the cost of the process of dressing leather when cod-liver oil is used. And in order that my invention may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me. In order to combine the fish blubber with cod-liver oil, preparatory to these matters being used in dressing leather, I place the blubber in a vessel and heat it by the vessel being in a water-bath, or by other convenient means, so as to render the blubber fluid, and I stir in the cod-liver oil, so as to intimately blend them, and I have found that this mixing may be conveniently carried on when the blubber has been heated to about 130° to 140° of Fahrenheit. I would state that I do not find it necessary to apply heat when mixing the materials, nor do I find it necessary to heat the cod-liver oil before mixing it with the blubber. I keep the mixture for use in a warm stove or room, heated to above seventy to eighty degrees of Fahrenheit, and when about to ladle out any quantity for use, I first stir the mixture in order to insure the successive quantities being as nearly equal in regard to the quantity of blubber and oil therein as may be. I have found that for most cases equal quantities or measures of blubber and cod-liver oil may be combined; but for thick skins a less quantity of blubber is desirable, as it is found less easy to cause the thick leather to absorb the mixture when so large a proportion of blubber is combined with the oil. In thin skins, however, more blubber than a half may conveniently be employed. And I have found that it is desirable to use the mixture when operating therewith at a temperature of seventy to eighty degrees of Fahrenheit. In other respects, the employment of the mixture of fish blubber and cod-liver oil is the same as that when using cod-liver oil only.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is, the combining blubber with cod-liver oil, and using them together in dressing leather.—In witness, &c.

WILLIAM TANNER.

Enrolled January 6, 1853.

Specification of the Patent granted to WILLIAM BURGESS, *of Newgate-street, Gutta Percha Merchant, for Improvements in the Manufacture of Gutta Percha Tubing.*—Sealed June 21, 1852.

To all to whom these presents shall come, &c., &c.—My invention consists of making gutta percha tubing with corrugations therein, whereby such tubing is made flexible in its length, and capable of being bent freely in varied directions and yet retain the tubular form in all parts, whether bent or straight. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

I prefer that the corrugations should be of a helical form, but do not confine myself thereto; and although I believe the best mode of making such tubes is that which I will proceed to describe, other or varied modes may be resorted to without departing from my invention. I prefer that the tubes should be composed wholly of gutta percha, but other materials may be combined therewith, as has heretofore been the case, so long as such admixture does not prejudice the character of gutta percha; I take a gutta percha tube intended to be corrugated and place it on a mandril upon which is formed a worm or screw of the form it is intended to give to the corrugations, and which mandril is of a size that will just pass into the tube to be corrugated, and such mandril having necks or axes at the ends, and I wrap a tape round the outside of the tube from end to end in order to keep it in form, when heat is applied to soften it, having previously applied soft soap to the exterior of the tube to prevent the tap adhering; I then enclose the tube by applying an external metal casing made in two halves, so as readily to be placed over the tube on the mandril, such case leaving a space between it and the tube all round, and I allow steam to flow into such case till the tube of gutta percha has become softened and will admit of being pressed into the corrugations or screw form of the mandril within; I then remove the case and I cause the tube to take the corrugated form by winding a cord on the outer surface of the tube progressively, unwinding the tape before the cord is wound on; and I have found that the best material for this purpose is a cord or

strip of vulcanized India-rubber, which by reason of its elasticity and softness is peculiarly suitable for pressing the warm tubing of gutta percha into the hollows of the mandril, thus forming the corrugations, and when the tube is nearly cold I withdraw the mandril by unscrewing it from the tube, and this I am enabled to do with facility in consequence of having applied soft soap to the surface of the mandril before inserting it within the tube.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that although I have been particular in describing the exact means pursued by me in carrying out my invention I do not confine myself thereto.

But what I claim is,

The manufacture of gutta percha tubes made with corrugations so as to render them flexible.—In witness, &c.

William Burgess.

Enrolled December 21, 1852.

Specification of the Patent granted to Theodore Coupier *and* Marie Amedee Charles Mellier, *of Maidstone, in the County of Kent, Gentleman, for Certain Improvements in the Manufacture of Paper.*—Sealed February 23, 1852.

To all to whom these presents shall come, &c., &c.—The first part of our invention, which is more especially to the treatment of shaw, and generally the herbaceous matters and barks of some trees, as willow, osier, chesnut-tree, and others, has for its object the making pulp therefrom by chemically acting thereon, as hereinafter explained, and dispensing with the use of machinery theretofore employed when reducing such matters to pulp to be used in the manufacture of paper. And the invention consists of employing a solution of soda or potash of such strength and in such manner as will together with the other means hereinafter described reduce the vegetable matters into pulp. And in order that this part of our invention may be most fully understood and readily carried into effect, we will proceed to describe the means pursued by us.

Description of the Process.

Staw or such like vegetable matter is to be cut up by a chaff-cutting machine before proceeding to operate according to our invention. And if bark or such like vegetable matters are to be employed the same is to be cut into chips or crushed. And such vegetable matters are then to be treated according to our invention, which commences with a process of employing a boiling solution of hydrate of soda or potash. And it is important that the solution should be of considerable strength, and we have found a solution of hydrate of soda or potash marking from seven to ten degrees of Baumé to be best strength, and we should state that a material departure from that strength, either above or below, will result in a failure to obtain the beneficial operation, which is consequent in the use of such alkaline solutions as herein described. The staw or vegetable matter is to be put in an open tub or vessel with a false bottom perforated with numerous small holes. This tub or vessel is covered when the process is being carried on; through the cover, there is a pipe with a rose-head thereon, the other end of such pipe descending into a close iron vessel and nearly to the bottom thereof; in this iron vessel, which is capable of containing about sixty or seventy gallons, the alkaline solution is to be placed, and by means of high-pressure steam from a suitable steam-boiler passing through a worm or coil in the iron vessel the liquor is boiled, and by a slight escape of steam from the worm is to be forced up the pipe and through the rose-head, by which streams of the boiling liquor will be forcibly thrown on the staw or vegetable matter lying on the false bottom of the tub. When one filling of the iron vessel has been forced into the tub and distributed over the vegetable matter herein, the iron vessel is again to be filled and such further quantity is to be forced over and through the rose-head by the steam, when the iron vessel is to be again filled and again emptied by the steam, until the quantity of alkaline solution proper for the quantity of vegetable matter in the tub has been forced by the steam into the tub. It should be understood that the steam is shut off from the iron vessel before running in quantities of the alkaline solution. When the whole of the liquor required has thus been forced into the tub containing the vegetable matter, a circulation of the liquor is to be caused to take place in the following manner:

—The cock on another pipe, hereinafter described, is to be opened and to remain open during the circulation. From the bottom of the tub raised some few inches above the top of the iron vessel proceeds another pipe as stated, with a cock on it, and also a self-acting valve opening into the iron vessel, by which a quantity of the liquor is run back into the said iron vessel, the steam being turned off for a time to allow of the same and to be again turned on to drive over the liquor, the valve closing by the pressure of the steam and preventing the liquor being forced under the false bottom while it is being blown upon the staw. And this process of circulation is to be combined for about eight or ten hours, when the cock on the pipe with the valve is shut, and the liquor is to be drawn off by another pipe at the bottom of the tub or vessel. Water is then to be run into the close iron vessel and is to be forced out therefrom by steam through the pipe and rose-head, as explained, and on to the staw or vegetable material in the vessel, and such processes of wash-waters are to be repeated till the waters coming off do not indicate a greater strength than one degree of Baumé; cold water is then to be run into the tub from any convenient source till it comes off clear. The quantity of alkaline solution employed by this means is at the rate of about thirty to forty gallons of the strength above mentioned for each hundred weight of vegetable matter. The vegetable material being well washed, as above described, is then put into a bath of hypochlorite of alumina (in order that it may be bleached and the fibres disaggregated, where it remains for twelve or eighteen hours) being stirred from time to time. The hypochlorite is used at the rate of about twenty to twenty-five per cent. by weight of the vegetable matter, using about seventy gallons of water for each hundred weight of vegetable matter, the solution of hypochlorite alumina will therefore be of a strength of about three degrees of Baumé. And we prefer to employ a stronger solution rather than a weaker one.

We should remark that, although we prefer to use hypochlorite of alumina, a solution of other hypochlorite of like strength may be used.

Hypochlorite of alumina may be obtained by means of double decomposition in dissolving sulphate of alumina, as neutral as possible in a solution of hypochlorite (common chloride) of lime, the proportion depending on the quality of these two substances will vary, but generally about

thirty-five of sulphate of alumina to one hundred of the hypochlorite of lime will be required. The vegetable matter, which is now reduced into what is called half stuff and of good colour, is to have the liquor strained off; this pulp is to be well washed (by preference in boiling water), in order completely to remove the hypochlorite, and complete the disaggregation of the fibres, and then it remains to beat it in the ordinary beating engines, and to make it into paper alone, or in combination with the pulp obtained from rags. In order to carry on our invention as economically as may be, we cause the alkaline liquor drawn off and the first wash waters to be evaporated, a resinous soap is thus obtained, which being mixed with charcoal-dust or saw-dust, or alone, produces a fuel from which may be obtained gas by destructive distillation in the ordinary manner, or the same may be burned as fuel, and from the ashes, by lixiviation, a considerable part of the alkali will be obtained for further use. We must observe that the above described process is also applicable to flax waste, cotton waste tows of hemp, jute, or surate; but this does not dispense with reducing them in half stuff by the means usually employed. We must also observe that the hydrate of soda or potash is obtained by slacking a proper quantity of lime in a solution of common soda ashes, or potash, and drawing off the clear liquors.

We will now describe the second part of our invention, which consists of employing nitric acid of such strength and in such manner that wood may be reduced to pulp thereby, and the same bleached, as hereinbefore described, without the necessity for mechanical operations; and by reason of using nitric acid of the strength and in the manner hereinafter mentioned, other useful products are obtained, as hereinafter described. In carrying out this part of our invention, we take the wood reduced to shavings,—pine, beach, ash, and elm, are peculiarly suited for this purpose, though others may be employed. In carrying on the process we use two tubs, each having a false perforated bottom into which the shavings of wood are to be pressed, and on to the shavings is placed a perforated cover, leaving about eight inches of empty space between such perforated cover and the close cover to the top of each tub. We use, at the rate of eighty per cent. by weight or more of white nitric acid (thirty-six degrees of Baumé), of the vegetable matter to be operated on according to our invention, and mix such acid with water, reducing the strength to about five or six

degrees of Beaumé. We run the proper quantity of diluted acid according to the quantity of wood to be operated on into one of the tubs, and allow the same to act on the wood for about four hours, when the liquid is to be brought to ebullition by means of fire or steam for about two hours, during which process fumes of nitreous acid will pass off, which are caused to be introduced into the other tub below the false perforated bottom, by a suitable pipe fixed to the cover of the first tub; by which means the shavings of wood (which are to be damped before) will be subjected to the fumes of nitreous acid. And there is to be a stream of atmospheric air forced into the tub below the false bottom, the object of which is to convert part of the fumes into hyponitric acid. The liquid having been drained off from the shavings of wood in the first tub, they are to be well washed with water, and such shavings are then to be subjected to the action of a solution of hydrate of soda or potash, of a strength of about two degrees of Beaumé, in which solution they are to be boiled for about two hours; they are again to be well washed with water, after which the fibres of the wood are to be subjected to a like process of hypochlorite of alumina, as above described, but in proportion of two per cent. in place of twenty-five per cent., when the fibres are to be washed, as in the former case, and they will be ready for use either alone or with the pulp from rags. The liquor drawn off from the first tub is to be placed in the second tub, into which the fumes of nitreous acid from the first tub have been passed, such liquor being strengthened by an addition of nitric acid, in the proportion of forty per cent. by weight of the raw material, and is to be operated on in the same manner, sending the fumes of nitreous acid in the first tub, filled again with new damped shavings; and in this manner may the said liquor be used several times, till it becomes too much thickened, when it is to be evaporated in earthenware vessels by a water bath; the liquor then will be reduced, and by cooling crystallized oxalic acid will be obtained, which may be purified in the ordinary manner, and the mother-water will contain another acid analogous to the nitro-furic acid, which is available for dyeing woollen and silks.

Having thus described the nature of our invention, and the manner in which the same is to be performed, we would have it understood that we do not confine ourselves to the

details herein described, so long as the peculiar character of either part of our invention be retained.

But what we claim is,

First, the mode herein described of reducing vegetable matters into pulp by means of a solution of hydrate of soda or potash, and the use of hypochlorites; and we also claim the mode herein described of employing hypochlorites of alumina for bleaching vegetable matters in the process of manufacturing paper; and,

Secondly, we claim the mode herein described of employing nitric acid in manufacturing other pulp, and obtaining other products.—In witness, &c.

MARIE AMEDEE MELLIER.
THEODORE COUPIER.

Enrolled August 23, 1852.

PATENTS SEALED UNDER PATENT LAW AMENDMENT ACT, 1852.

From December 31, 1852, *to January* 26, 1853.

57. JOHN JOSEPH MACDONNELL, of Templemead, Bristol, Civil Engineer, for Certain improvements in the construction of railways.—Dated October 1. Sealed December 31, 1852.

84. EDWIN PETTITT, of Kingsland, Middlesex, Civil Engineer, for Improvements in the manufacture of ammoniacal salts and manures.—Dated October 1. Sealed December 31, 1852.

221. WILLIAM CROSSKILL, of Beverley, in the county of York, Civil Engineer, for Improvements in machines for cutting or reaping growing corn, clover, and grass.—Dated October 1. Sealed December 31, 1852.

250. WILLIAM ARMAND GILBEE, of South-street, Finsbury, in the county of Middlesex, Gentleman, for An improved mode of disinfecting putrified and converting fecal matters into manure, also applicable to the disinfection of cesspools, drains, sewers, and other similar receptacles.—Dated October 6. Sealed December 31, 1852.

382. WILLIAM CHISHOLM, of Holloway, Middlesex, Chemist, for Improvements in the purification of gas, and

the obtention of certain products during the process of such purification.—Dated October 14. Sealed December 31, 1852.

440. Fennell Herbert Allman, Civil Engineer, of Westbourne-street, Hyde-park, for Certain improvements in the manufacture and construction of brushes.—Dated October 19. Sealed December 31, 1852.

493. George Price, of Birmingham, Stove Manufacturer, for A new or improved gas stove.—Dated October 23. Sealed December 31, 1852.

487. Archibald Slate, of Dudley, Worcester, Civil Engineer, for Certain improvements in the manufacture and construction of cores and core-bars, used in the production of hollow castings in iron and other metals.—Dated October 22. Sealed December 31, 1852.

523. William Clark, of Manchester, Engineer, for Improvements in joints for connecting metals.—Dated October 26. Sealed December 31, 1852.

557. Robert Mallet, of Dublin, Engineer, for Improvements in fire-proof and other buildings and structures.—Dated October 28. Sealed December 31, 1852.

558. Henry Robert Ramsbotham, of Bradford, York, Worsted Spinner, and William Brown, of the same place, Mechanic, for Improvements in preparing and combing wool and other fibrous substances.—Dated October 29. Sealed December 31, 1852.

644. George Shand, of Glasgow, and Andrew M'Lean, of Edinburgh, Chemists, for Improvements in obtaining products of tar.—Dated November 5. Sealed December 31, 1852.

680. William Thomas Henley, of Saint John-street-road, London, Electrical Engineer, for Certain improvements in electric telegraphs, and in the apparatus and instruments connected therewith.—Dated November 9. Sealed December 31, 1852.

40. Frederick Richard Holl, of Weymouth-terrace, City-road, Middlesex, Watch Maker, for Improvements in watches and chronometers.—Dated October 1, 1852. Sealed January 5, 1853.

59. Marcus David, of Lyon's-inn, Strand, Westminster, for Improvements in the manufacture of carriages, carts, military and other waggons, and wheels for locomotive and other purposes.—Dated October 1, 1852. Sealed January 5, 1853.

127. ROBERT WHIPPLE PARKER, of Roxbury, in the State of Massachusetts, and United States of America, for A new or improved mode of giving rotatory motion to a shaft of a circular saw, or other mechanical contrivance. —Dated October 1, 1852. Sealed January 5, 1853.

160. JOSEPH BURCH, of Craig Hall, near Macclesfield, in the county of Chester, Carpet Manufacturer, for Certain improvements in building and propelling ships and vessels.—Dated October 2, 1852. Sealed January 5, 1853.

184. JOSEPH NEEDHAM, of No. 26, Piccadilly, in the county of Middlesex, Gun Manufacturer, for Improvements in breech-loading fire-arms, and in apparatus connected therewith.—Dated October 2, 1852. Sealed January 5, 1853.

191. JOHN STRINGFELLOW, of Chard, in the county of Somerset, Engineer, for Improvements in galvanic batteries, for medical and other purposes.—Dated October 2, 1852. Sealed January 5, 1853.

192. GEORGE JOHN PHILPS, of Friday-street, in the city of London, Manufacturer, for Improvements in hats and other like coverings for the head.—Dated October 2, 1852. Sealed January 5, 1853.

195. GEORGE STUART, of Glasgow, in the county of Lanark, North Britain, Merchant, for Improvements in treating the fleeces or natural coverings of sheep and other animals when on the animals.—Dated October 2, 1852. Sealed January 5, 1853.

206. JOHN MOSELEY, of Birmingham, in the county of Warwick, Engineer, for Certain improvements in machinery for cleansing linen and other fibrous materials.—Dated October 4, 1852. Sealed January 5, 1853.

297. ALFRED KENT, of Chichester, in the county of Sussex, for Improvements in glazing.—Dated October 7, 1852. Sealed January 5, 1853.

338. ROBERT LAMBERT, of No. 13, Goree Piazza, Liverpool, in the county of Lancaster, for Improvements in tents.—Dated October 11, 1852. Sealed January 5, 1853.

392. JOSEPH BURCH, of Craig Hall, near Macclesfield, Carpet Manufacturer, for Certain improvements in baths and bathing.—Dated October 15, 1852. Sealed January 5, 1853.

393. JOSEPH BURCH, of Craig Hall, near Macclesfield, Carpet Manufacturer, for Certain improvements in build-

ing ships and vessels for the purpose of saving lives and property in cases of shipwreck or fire at sea.—Dated October 15, 1852. Sealed January 5, 1853.

399. JOSEPH HOPKINSON, the younger, of Huddersfield, York, Engineer, for Improvements in steam-boilers.—Dated October 15, 1852. Sealed January 5, 1853.

400. SIMON PINCOFFS, of Manchester, Manufacturing Chemist, and HENRY EDWARD SCHUNK, of Rochdale, Doctor of Philosophy, for Improvements in the treatment of madder and other plants of the same species, and of their products, for the purpose of obtaining dyeing materials.—Dated October 15, 1852. Sealed January 5, 1853.

415. WILLIAM BECKETT JOHNSON, of Manchester, Manager for Messrs. Ormerod and Son, Engineers and Iron Founders, for Improvements in stationary steam-engines.—Dated October 16, 1852. Sealed January 5, 1853.

419. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, for Improvements in the manufacture and applications of hyposulphite and similar compounds of zinc.—Dated October 16, 1852. Sealed January 5, 1853.

441. JOHN KEALY, of Oxford-street, Agricultural Implement-maker, for Improvements in machinery or apparatus for cutting or slicing roots.—Dated October 19, 1852. Sealed January 5, 1853.

474. WILLIAM WEILD, of Manchester, Lancaster, Engineer, for Improvements in looms for weaving certain descriptions of pile fabrics.—Dated October 21, 1852. Sealed January 5, 1853.

554. JOHN COLLIS BROWNE, Assistant-Surgeon, of Chatham, for The relief of individuals suffering from pulmonary affections or diseases of the chest.—Dated October 28, 1852. Sealed January 5, 1853.

570. MARTIN WATTS, of Patricroft, near Manchester, Cotton Spinner, for Certain improvements in machinery or apparatus for roving or preparing cotton and other fibrous substances for spinning.—Dated October 30, 1852. Sealed January 5, 1853.

582. JAMES SINCLAIR, of Stirling, North Britain, for Improvements in engines to be worked by steam, air, or water; the said improvements being also applicable to pumps.—Dated October 30, 1852. Sealed January 5, 1853.

645. PETER FAIRBAIRN, of Leeds, Machinist, for Certain improvements in self-acting reeling machinery, for reel-

ing flax and other yarns into hanks.—Dated November 5, 1852. Sealed January 5, 1853.

646. George Fife, of Newcastle-upon-Tyne, Doctor of Medicine, for Improvements in steam and water guages.—Dated November 5, 1852. Sealed January 5, 1853.

662. Peter Fairbairn, of Leeds, Machinist, and John H. Kirkstall, Manufacturer, for Certain improvements in machinery for opening, combing, and drawing wool, flax, and other fibrous materials.—Dated October 30, 1852. Sealed January 5, 1853.

719. Sir Charles Fox, Knight, of New-street, Spring-gardens, Middlesex, for Improvements in roads.—Dated November 12, 1852. Sealed January 5, 1853.—(Communication.)

726. John Henry Johnson, of No. 47, Lincoln's-inn-fields, Middlesex, for Improvements in reaping machines and in apparatus connected therewith.—Dated November 12, 1852. Sealed January 5, 1853.—(Communication.)

1. Robert Adams, of King William-street, London, for Improvements in ball-cartridges.—Dated October 1, 1852. Sealed January 8, 1853.

2. George Henry Brockbank, of Crawley-street, Oakley-square, Middlesex, Piano-Forte Manufacturer, for Improvements in upright piano-fortes.—Dated October 1, 1852. Sealed January 8, 1853.

4. James Hodgson, of Liverpool, Engineer and Iron Ship Builder, for Improvements in constructing iron ships and vessels.—Dated October 1, 1852. Sealed January 8, 1853.

9. George Green, of Mile End-road, Middlesex, for Improvements in the manufacture of casks.—Dated October 1, 1852. Sealed January 8, 1853.

13. Edward Lambert Hayward, of Blackfriars-road, Surrey, for Improvments in lock-spindles.—Dated October 1, 1852. Sealed January 8, 1853.

32. William Pym Flynn, of No. 18, Rutland-place, in the county of Cork, for Improvements in paddle-wheels.—Dated October 1, 1852. Sealed January 8, 1853.

33. Moses Poole, of Serle-street, Middlesex, Gentleman, for Improvements in the manufacture of pails, tubs, baths, buckets, measures, drinking, and other vessels, basins, pitchers, and jugs, by the application of a material not hitherto used in such manufactures.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

37. Moses Poole, of Serle-street, Middlesex, for Improvements in covering and sheathing surfaces with a material not hitherto used for such purposes.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

43. Moses Poole, of Serle-street, Middlesex, Gentleman, for Improvements in harness, and in horse and carriage furniture.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

120. George Collier, of Halifax, York, Mechanic, for Improvements in the manufacture of carpets and other fabrics.—Dated October 1, 1852. Sealed January 8, 1853.

121. John Lee Stevens, of Kennington, Surrey, for Improvements in furnaces.—Dated October 1, 1852. Sealed January 8, 1853.

123. Richard Whytock, of Green-park, Midlothian, for Improvements in the manufacture of fringes and of pleat for these and other ornamental works.—Dated October 1, 1852. Sealed January 8, 1853.

136. William George Nixey, of Moor-street, Middlesex, Oil and Colourman, for Improvements in tills and other receptacles for money.—Dated October 1, 1852. Sealed January 8, 1853.

162. John Ignatius Fuchs, Engineer and Watchmaker, of Zerbst, Duchy of Anhalt Dessau, for An electro-magnetic apparatus.—Dated October 2, 1852. Sealed January 8, 1853.

163. Moses Poole, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in the manufacture of tables, sofas, bedsteads, stands, chairs, and other articles of furniture, and the frames and bodies of musical instruments.—Dated October 2, 1852. Sealed January 8, 1853.—(Communication.)

230. James Bullough, Manufacturer, David Whittaker, Overlooker, and John Walmesley, Mechanical Designer, all of Blackburn, in the county of Lancaster, for Improvements in sizing machines.—Dated October 5, 1852. Sealed January 8, 1853.

246. George Hallen Cottam, of Charles-street, Hampstead-road, in the county of Middlesex, Engineer, for Improvements in chairs, sofas, and bedsteads.—Dated October 5, 1852. Sealed January 8, 1853.

273. John Frederick Chatwin, of Birmingham, in the county of Warwick, for Improvements in the manufacture of brushes.—Dated October 6, 1852. Sealed January 8, 1853.

274. John Frederick Chatwin, of Birmingham, in the county of Warwick, for Improvements in the manufacture of buttons.—Dated October 6, 1852. Sealed January 8, 1853.

315. Alexander Clark, of Gate-street, Lincoln's-inn-fields, Engineer, and Patrick Clark, of the same place, Engineer, for Improvements in the manufacture of shutters, doors, and windows.—Dated October 9, 1852. Sealed January 8, 1853.

624. Edward Lord, of Todmorden, York, Machine-maker, for Improvements in certain machinery to be used in preparing, spinning, and weaving cotton and other fibrous substances.—Dated November 3, 1852. Sealed January 8, 1853.

659. John, Edward, and Charles Gosnell, Brush Manufacturers, of Three-king-court, Lombard-street, for Certain improvements in brushes.—Dated November 6, 1852. Sealed January 8, 1853.

674. Peter Fairbairn, of Leeds, Machinist, for Certain improvements in the ordinary screw-gill machinery, when applied to the purposes of drawing, combing, and heckling fibrous materials.—Dated November 8, 1852. Sealed January 8, 1853.

776. Francis Bresson, Civil Engineer, of Paris, for A new and improved mode of propelling on land and water.—Dated November 17, 1852. Sealed January 8, 1853.

34. Robert Beart, of Godmanchester, for Improvements in the manufacture of bricks and articles through moulding orifices.—Dated October 1, 1852. Sealed January 12, 1853.

35. Thomas Huckvale, of Choice-hill, near Chipping Norton, for Improvements in instruments for administering medicine to horses and other animals.—Dated October 1, 1852. Sealed January 12, 1853.

39. Felix Abate, of 24, George-street, Hampstead-road, and John Julius Clero de Clerville, of Newman-street, for Improvements in preparing, ornamenting, and printing on surfaces of metal and other substances.—Dated October 1, 1852. Sealed January 12, 1853.

41. Joseph Barrans, of Queen's-road, Surrey, for Improvements in steam-engine boilers.—Dated October 1, 1852. Sealed January 12, 1853.

45. Charles William Rowley Richards, of 28, New-cut, Blackfriars-road, Surrey, for Improvements in tongs for screwing pipes and tubes.—Dated October 1, 1852. Sealed January 12, 1853.

47. Stephen Perry, of Red-Lion-square, for Improvements in inkstands or inkholders.—Dated October 1, 1852. Sealed January 12, 1853.

48. Edmund Morewood and George Rogers, of Enfield, for Improvements in rolling metal.—Dated October 1, 1852. Sealed January 12, 1853.

49. Edmund Morewood and George Rogers, of Enfield, for Improvements in coating metals.—Dated October 1, 1852. Sealed January 12, 1853.

124. John Husband Highway, of New-road, for Improvements in paving roads and other surfaces.—Dated October 1, 1852. Sealed January 12, 1853.

125. Thomas Hunt, of Lemon-street, for Improvements in fire-arms.—Dated October 1, 1852. Sealed January 12, 1853.

130. Isaac Westhorp, of 9, George-yard, for Improvements in grinding wheat and other grain.—Dated October 1, 1852. Sealed January 12, 1853.

137. John Jackson, of Exchange-court, Liverpool, for Improvements in gas-burners.—Dated October 1, 1852. Sealed January 12, 1853.

141. Astley Paston Price, of Margate, for Improvements in the manufacture of citric and tartaric acids, and of certain salts of potash, soda, ammonia, lime, and baryta.—Dated October 1, 1852. Sealed January 12, 1853.

167. Joseph Faulding, of Edward-street, Hampstead-road, in the county of Middlesex, for Improvements in machinery for sawing and cutting wood and other substances.—Dated October 2, 1852. Sealed January 12, 1853.

169. Moses Poole, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in machinery for mowing and reaping.—Dated October 2, 1852. Sealed January 12, 1853.—(Communication.)

243. Samuel Getley, of 6, Ivy-street, Birkenhead, in the county of Chester, for Improvements in water-closets.—Dated October 5, 1852. Sealed January 12, 1853.

244. Joseph Westby, of Nottingham, in the county of Nottingham, for Improvements in machinery applicable to the manufacture of lace and other weavings.—Dated October, 5, 1852. Sealed January 12, 1853.

245. William Dray, of Swan-lane, London-bridge, in the city of London, for Improvements in machinery for reaping and mowing.—Dated October 5, 1852. Sealed January 12, 1853.

247. CHRISTOPHER NICKELS, of York-street, Lambeth, in the county of Surrey, Gentleman, and FREDERICK THORNTON, of the borough of Leicester, in the county of Leicester, Designer, for Improvements in weaving.—Dated October 5, 1852. Sealed January 12, 1853.

271. JOSEPH WESTBY, of Nottingham, for Improvements in twist lace machinery.—Dated October 6, 1852. Sealed January 12, 1853.

272. JOSEPH HILL, of Birmingham, in the county of Warwick, Stamper, &c., for A machine for stamping metals and forging iron and steel.—Dated October 6, 1852. Sealed January 12, 1853.

276. FRANCIS WARREN, of No. 16, Millbank-street, in the county of Middlesex, for Improvements in gas-burners.—Dated October 6, 1852. Sealed January 12, 1853.

277. Admiral the Earl of DUNDONALD, of Belgrave-road, in the county of Middlesex, for Improvements in coating and insulating wire.—Dated October 6, 1852. Sealed January 12, 1853.

278. WILLIAM ADOLPH, of No. 9, Bury-court, St. Mary Axe, London, for Improvements in apparatus for warming and ventilating rooms.—Dated October 6, 1852. Sealed January 12, 1853.

295. PETER WARD, of Oldbury, in the county of Worcester, for Improvements in the manufacture of sal-ammoniac and obtaining salts of ammonia.—Dated October 7, 1852. Sealed January 12, 1853.

336. CHARLES MATTHEW BARKER, of No. 22, Portsmouth-place, Kennington-lane, in the county of Surrey, for Improvements in sawing wood.—Dated October 11, 1852. Sealed January 12, 1853.

337. HENRY McFARLANE, of No. 8, Lawrence-lane, in the city of London, for Improvements in stoves or fire-places.—Dated October 11, 1852. Sealed January 12, 1853.

357. THOMAS BARNABAS DAFT, of the Isle of Man, for Improvements in inland conveyance.—Dated October 12, 1852. Sealed January 12, 1853.

376. HENRY McFARLANE, of Lawrence-lane, Merchant, for Improvements in constructing metal beams or girders. —Dated October 13, 1852. Sealed January 12, 1853.

389. JAMES WEBSTER, of Leicester, Engineer, for Improvements in the construction of springs.—Dated October 14, 1852. Sealed January 12, 1853.

390. JOHN SWINDELLS, of Pollard-street, Manchester, Gentleman, and WILLIAM NICHOLSON, of Manchester, Gentleman, for Improvements in obtaining oxygen gas, and applying it in the manufacture of various acids and chlorine, for oxydating metallic solutions, and for ageing and raising various colouring matters.—Dated October 14, 1852. Sealed January 12, 1853.

413. CHARLES TIOT JUDKINS, of Britannia Works, Manchester, for Improvements in machinery or apparatus for sewing or stitching.—Dated October 16, 1852. Sealed January 12, 1853.

420. JOHN OLIVER YORK, of Paris, Engineer, for Improvements in connecting and in fixing rails in railway chairs.—Dated October 16, 1852. Sealed January 12, 1853.

432. EDWIN HEYWOOD, of Glasburn, York, Foreman to Messrs. Bairstow, of Sutton Mills, Keighley, York, for Improvements in looms.—Dated October 10, 1852. Sealed January 12, 1853.

446. ROBERT BIRD, of Crewkerne, Somerset, for Improvements in the straining webs of saddles.—Dated October 19, 1852. Sealed January 12, 1853.

448. JAMES OTAMS, of Holloway, Middlesex, Gentleman, for Improvements in the manufacture of manure.—Dated October 19, 1852. Sealed January 12, 1853.

464. JOHN GILBERT, of No. 79, Wardour-street, and SAMUEL NYE, of the same place, for Improvements in mincing meat and other substances.—Dated October 20, 1852. Sealed January 12, 1853.

469. ROBERT HOPPEN, of Plymouth, a Master in Her Majesty's Navy, for Improvements in apparatus for mincing meat.—Dated October 21, 1852. Sealed January 12, 1853.

480. JOHN FOWLER, of Temple-gate, Bristol, for Improvements in machinery for draining land.—Dated October 21, 1852. Sealed January 12, 1853.

481. JOHN FOWLER, of Temple-gate, Bristol, for Improvements in laying wires for electric telegraphs.—Dated October 21, 1852. Sealed January 12, 1853.

482. JOHN FOWLER, of Temple-gate, Bristol, for Improvements in reaping machinery.—Dated October 21, 1852. Sealed January 12, 1853.

483. JOHN FOWLER, of Temple-gate, Bristol, for Improvements in machinery for sowing seed and depositing

manure.—Dated October 21, 1852. Sealed January 12, 1853.

491. JAMES WILSON, of No. 37, Walbrook, for Improvements in printing fabrics of silk, or partly of silk.—Dated October 22, 1852. January 12, 1853.

509. CHARLES WATSON, of No. 31, Rhodes-street, Halifax, York, for Improvements in ventilation.—Dated October 23, 1852. Sealed January 12, 1853.

510. JOHN TAYLER, of Manchester, Engineer, and JAMES SLATER, of the same place, Gentleman, for Certain improvements in machinery apparatus or implements for weaving.—Dated October 23, 1852. Sealed January 12, 1853.

621. BERNHARD SAMUELSON, of Banbury, Oxford, for Improvements in breaking up and tilling land.—Dated November 2, 1852. Sealed January 12, 1853.

657. JOHN MELVILLE, of Porchester-terrace, Middlesex, Esquire, for Improvements in the application of iron, and of wood combined with iron or other substances, to buildings and other constructions.—Dated November 6, 1852. Sealed January 12, 1853.

746. JOSEPH COWEN, of Blaydon Burn, near Newcastle-upon-Tyne, and THOMAS RICHARDSON, of Newcastle-upon-Tyne, for Improvements in the manufacture of sulphuric acid.—Dated November 15, 1852. Sealed January 12, 1853.

751. PETER ARMAND LE COMTE DE FONTAINEMOREAU, of Finsbury, for Certain improvements in lamps.—Dated November 15, 1852. Sealed January 12, 1853.—(A communication.)

762. JOSEPH BURLEY, of Halifax, Mechanic, for Improvements in apparatus for cutting fustians and other fabrics, to obtain a cut piled surface.—Dated November 15, 1852. Sealed January 12, 1853.

46. JAMES STEWART, of Old Saint Pancras-road, for Improvements in the action of pianofortes.—Dated October 1, 1852. Sealed January 13, 1853.

122. DUNCAN BRUCE, of Canada, North America, for Improvements in rotary steam-engines.—Dated Octobcr 1, 1852. Sealed January 13, 1853.

300. Professor ANDREW CRESTADORO, of Adelphi-place, Salford, for Improvements in impulsoria, or machinery for applying animal power to railways, waterways, and common roads.—Dated October 8, 1852. Sealed January 13, 1853.

507. Felix Lieven Bauwens, of Croydon, Chemist and Manufacturer, for Improvements in treating fatty matters prior to their being manufactured into candles and mortars.—Dated October 23, 1852. Sealed January 13, 1853.

532. John Lee Stevens, of Kennington, Surrey, for Improvements in furnaces.—Dated October 27, 1852. Sealed January 13, 1853.

556. Charles Arthur Redl, of Davis-street, Berkeley-square, Middlesex, for Improvements in telegraphing or communicating signals at sea and otherwise.—Dated Oct. 28, 1852. Sealed January 13, 1853.

702. Joseph Tringham Powell, of Fenchurch-street, for Improvements in mixing, baking, and drying materials in the making of biscuits, and other articles where plastic matters are employed.—Dated November 10, 1852. Sealed January 13, 1853.

755. James Robertson, of Glasgow, Cooper, for Improvements in the manufacture of casks and other wooden vessels.—Dated November 15, 1852. Sealed January 13, 1853.

778. Henry Vernon Physick, of Aberdeen-place, Maida Hill, Middlesex, Civil Engineer, for Improvements in electric telegraphic apparatus, and in machinery or apparatus for constructing the same.—Dated November 17, 1852. Sealed January 13, 1853.

812. William Crosskill, of Beverley, York, Civil Engineer and Ironfounder, for Improvements in clod-crushers, or rollers for rolling, crushing, or pressing land. —Dated November 22, 1852. Sealed January 13, 1853.

856. Richard Dudgeon, of New York, Machinist, for raising heavy weights, by means of a portable hydraulic press.—Dated November 25, 1852. Sealed January 13, 1853.

335. Robert Cochran, of Glasgow, in the county of Lanark, Potter, for Improvements in kilns.—Dated Oct. 11, 1852. Sealed January 13, 1853.

3. Peter Spence, of Pendleton Alum Works, Manchester, in the county of Lancaster, for Improvements in obtaining power by steam.—Dated October 1, 1852. Sealed January 14, 1853.

212. Thomas Slater, of Somer's-place, New-road, St. Pancras, in the county of Middlesex, Optician, and Joseph John William Watson, of Old Kent-road, in the county of Surrey, Doctor of Philosophy, for Improve-

ments in the application of electricity to illuminating purposes.—Dated October 4, 1852. Sealed January 14, 1853.

265. DAVID COLLISON, of Preston, in the county of Lancaster, Cloth Looker, for Improvements in the construction of shuttle-skewers.—Dated October 6, 1852. Sealed January 14, 1853.

579. ALFRED VINCENT NEWTON, of Chancery-lane, for Improvements in machinery for cutting corn and other standing crops.—Dated October 30, 1852. Sealed January 14, 1853.—(Communication.)

595. JOSEPH JOHN WILLIAM WATSON, of Old Kent-road, Surrey, and THOMAS SLATER, of St. Pancras, for Improvements in galvanic batteries, and in the application of electric currents to the production of electrical illumination and of heat, and in the production of chemical products by the aforesaid improvements in galvanic batteries.—Dated November 1, 1852. Sealed January 14, 1853.

666. BENJAMIN BAILLIE, of Wardour-street, Soho, for Improvements in apparatus for drawing off and registering the flow of fluids.—Dated November 6, 1852. Sealed January 14, 1853.

685. ROBERT KNOWLES, of Chorlton-upon-Medlock, Lancaster, Mechanic, for Certain improvements in boilers and apparatus for generating steam.—Dated November 9, 1852. Sealed January 14, 1853.

695. ROBERT BUNCOMBE EVANS, of Colyton, Devon, for Improvements in the manufacture of charcoal.—Dated November 9, 1852. Sealed January 14, 1853.

741. SAMUEL SEDGWICK, of Piccadilly, for Improvements in lamps.—Dated November 13, 1852. Sealed January 14, 1853.

747. ROBERT REYBURN, of Greenock, Renfrew, for Improvements in the composition of lozenges and other confections.—Dated November 15, 1852. Sealed January 14, 1853.

774. JOHN HINCHCLIFF, of Leeds, York, Engineer, and RALPH SALT, of Leeds, Engineer, for Improvements in steam-engines.—Dated November 17, 1852. Sealed January 14, 1853.

808. GEORGE WILSON, of the York Glass Company, for An improved manufacture of glass bottles and jars.—Dated November 20, 1852. Sealed January 14, 1853.

827. JOHN KILNER, of Thornhill Lees, near Dewsbury,

York, Glass Bottle Manufacturer, for Certain improvements in the means of insulating the wires of electric telegraphs.—Dated November 23, 1852. Sealed January 14, 1853.

11. THOMAS WOOD GRAY, of Warkworth-terrace, Commercial-road, Limehouse, for Improvements in cocks and valves.—Dated October 1, 1852. Sealed January 17, 1853.

129. JOSEPH COX, of Heston, Middlesex, for Improvements in the manufacture of gates and hurdles.—Dated October 1, 1852. Sealed January 17, 1853.

146. EDWIN LEWIS BRUNDAGE, of Jewin-crescent, City, Gentleman, for Improved machinery for forging nails, brads, and screw-blanks. — Dated October 1, 1852. Sealed January 17, 1853.—(Communication.)

204. BENDIX ISING JACOBY, of Hamburgh, Dentist, for Improvements in the means of fixing artificial teeth.—Dated November 4, 1852. Sealed January 17, 1853.

275. ALPHONSE RENE LE MIRE DE NORMANDY, of Judd-street, in the county of Middlesex, for Improvements in obtaining fresh water from salt water.—Dated October 6, 1852. Sealed January 17, 1853.

358. WILLIAM H. SMITH, of the county of Montgomery, and State of Pennsylvania, America, Clergyman, for Improvements in the manufacture of lava ware.—Dated October 12, 1852. Sealed January 17, 1853.

533. ANTHONY FOTHERGILL BAINBRIDGE, of Putney, Surrey, for Improvements in the manufacture of artificial flies and other bait for fish.—Dated October 27, 1852. Sealed January 17, 1853.

534. SAMUEL CLARK, of Albany-street, Regent's-park, Lamp and Candle Manufacturer, for Improvements in the manufacture of candles.—Dated October 27, 1852. Sealed January 17, 1853.

564. WILLIAM BATES, of Leicester, Fuller and Dresser, for Improvements in apparatus for getting up stockings and other hosiery goods.—Dated October 29, 1852. Sealed January 17, 1853.

574. JOHN GEDGE, of Wellington-street, Strand, for Improvements in printing presses or machines.—Dated October 30, 1852. Sealed January 17, 1853.—(Communication.)

588. GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, Managing Director of Price's Patent Candle Com-

pany, and EDWARD PARTRIDGE, of Wandsworth, Gentleman, for Improvements in the instruments or apparatus used when burning candles.—Dated October 30, 1852. Sealed January 17, 1853.

592. GEORGE DIXON, of Dublin, Soap and Candle Manufacturer, for An improvement in bleaching palm oil. —Dated November 1, 1852. Sealed January 17, 1853.

600. GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, in the county of Surrey, Managing Director of Price's Patent Candle Company, for Improvements in the manufacture and treatment of oils.—Dated November 1, 1852. Sealed January 17, 1853.

602. JOHN CHUBB, of Saint Paul's Churchyard, City, for Improvements in locks.—Dated November 1, 1852. Sealed January 17, 1853.

620. GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, Managing Director of Price's Patent Candle Company, for Improvements in treating wool in the manufacture of woollen and other fabrics.—Dated November 2, 1852. Sealed January 17, 1853.

635. CHARLES PRYSE and RICHARD REDMAN, both of Birmingham, Gun Makers, for Improvements in a certain description of firearms.—Dated November 4, 1852. Sealed January 17, 1853.

655. ROBERT BOOTY COUSENS, of No. 50, Halliford-street, Middlesex, for Improvements in machinery for cutting cork.—Dated November 5, 1852. Sealed January 17, 1853.

656. Admiral the EARL OF DUNDONALD, of Belgrave-road, for Improving bituminous substances, thereby rendering them available for purposes to which they never heretofore have been successfully applied.—Dated November 5, 1852. Sealed January 17, 1853.

664. JOHN ARTHUR PHILLIPS, of Upper Stamford-street, Blackfriars, for Improvements in purifying tin.—Dated November 6. Sealed January 17, 1853.

665. THOMAS HICKS CHANDLER, of Aldbourn, Wilts, for Improvements in hoes.—Dated November 6, 1852. Sealed January 17, 1853.

667. WILLIAM FREDERICK DE LA RUE, of Bunhill-row, and GEORGE WATERSON, of Edinburgh, for Improvements in writing cases.—Dated November 6, 1852. Sealed January 17, 1853.

694. CHARLES GRIFFIN, of Leamington Spa, Gentle-

man, for Improvements in apparatus for fixing type or printing surfaces in a chase.—Dated November 9, 1852. Sealed January 17, 1853.

697. OBED HUSSEY, of Manchester, for Improvements in reaping machines.—Dated November 9, 1852. Sealed January 17, 1853.

710. JAMES NOBLE, of Leeds, Manufacturer, for Improvements in combing wool, and other fibres.—Dated November 11. Sealed January 17, 1853.

711. COLIN MATHER and WILLIAM WILKINSON PLATT, of Salford Iron Works, Salford, Millwrights and Engineers, for Improvements in machinery for finishing linen, cotton, and other fabrics.—Dated November 11, 1852. Sealed January 17, 1853.

738. RICHARD COAD, of London, and JOHN PEERS COAD, of Liverpool, for Improvements in fire-places and means of applying heat.—Dated November 13, 1852. Sealed January 17, 1853.

740. Admiral the EARL OF DUNDONALD, of the Belgrave-road, Middlesex, for Improvements in apparatus for laying telegraphic or galvanic wires in the earth.—Dated November 13, 1852. Sealed January 17, 1853.

760. JOHN DENT GOODMAN, of Birmingham, Merchant, for Improvements in the boxes and axles for carriages.—Dated November 15, 1852. Sealed January 17, 1853.—(Communication.)

761. SAMUEL HOLT, of Stockport, Cheshire, Foreman to Messrs. Christy and Co., of the same place, and of Gracechurch-street, London, for Improvements in weaving cut piled fabrics.—Dated November 15, 1852. Sealed January 17, 1853.

771. JOHN THOMAS WAY, of Holles-street, Cavendish-square, Professor of Chemistry, and JOHN MANWARING PAINE, of Farnham, Surrey, Gentleman, for Improvements in the manufacture of burned and fired ware.—Dated November 17, 1852. Sealed January 17, 1853.

772. ISAAC LOWTHIAN BELL, of the Washington Chemical Works, Newcastle-upon-Tyne, for Improvements in the treatment of certain compounds of iron and sulphur.—Dated November 17, 1852. Sealed January 17, 1853.

785. PETER CARMICHAEL, of Den's Works, Dundee, for Improvements in machinery for winding yarn or thread.—Dated November 19, 1852. Sealed January 17, 1853.

786. JOHN BURGESS, of Rastrick, Halifax, Dyer, for

An improvement in dyeing wool.—Dated November 19, 1852. Sealed January 17, 1853.

790. BENJAMIN NICKELS, of Albany-road, Surrey, for Improvements in the manufacture of adhesive plaster.—Dated November 19, 1852. Sealed January 17, 1853.

802. JOHN BRETTELL COLLINS, of Birmingham, Factor, for a New improved flooring cramp or lifting jack.—Dated November 20, 1852. Sealed January 17, 1853.

818. WILLIAM HEDGES, of Streatham Hill, Surrey, for Improvements in carriages.—Dated November 22, 1852. Sealed January 17, 1853.

833. JOHN FREARSON, of Birmingham, for Improvements in the manufacture of hooks for garments.—Dated November 23, 1852. Sealed January 17, 1853.

862. ANDREW JEFFREY, of Chirnside, Berwick, Scotland, Blacksmith, for Improvements in reaping machines.—Dated November 25, 1852. Sealed January 17, 1853.

211. THOMAS SCOTT, of No. 111, Drummond-street, Euston-square, Gentleman, for Improvements in applying and transmitting motive power, and in accelerating the progress of bodies in motion.—Dated October 4, 1852. Sealed January 19, 1853.

308. JOHN LEWTHWAITE, of Halifax, in the county of York, Gentleman, for Improvements in cards and tickets, and in machinery for cutting, printing, numbering, and marking, cards, tickets, and paper.—Dated October 8, 1852. Sealed January 19, 1853.

452. JOHN CARNABY, of No. 130, St. John's-street, Clerkenwell, Gentleman, for Apparatus for turning, managing, and regulating the main taps of gas pipes laid on to houses or buildings, at a part of the house or building, distant from the main tap.—Dated October 20, 1852. Sealed January 19, 1853.

627. ALFRED AUGUSTUS DE REGINALD HELY, of Cannon-row, Westminster, Civil Engineer, for an Improved shade or chimney for lamps, chandeliers, gas and other burners.—Dated November 3, 1852. Sealed January 19, 1853.

713. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, Gentleman, for Improvements in machinery or apparatus for sewing and stitching.—A communication.—Dated November 11, 1852. Sealed January 19, 1853.

824. JOHN WINTER, of Bradford, York, Engineer, for Improvements in the mode of combining bars of iron so

as to form larger masses or pieces of iron applicable in the manufacture of axles, shafts, columns, beams, cannon, and other articles.—Dated November 23, 1852. Sealed January 19, 1853.

825. JOHN WINTER, of Bradford, York, Engineer, for Improvements in the manufacture of wheels.—Dated November 23, 1852. Sealed January 19, 1853.

865. CHARLES HARTFORD, of Down-place, near Windsor, Esq., for Improvements in rotatory engines.—Dated November 25, 1852. Sealed January 19, 1853.

871. James Taylor, Engineer, of Messrs. James Taylor and Co., Britannia Works, Birkenhead, for Certain improvements in and applicable to floating graving docks for repairing and building ships.—Dated November 26, 1852. Sealed January 19, 1853.

880. ALEXANDER TURIFF, of the New Town Foundry, Paisley, North Britain, Engineer, for Improvements in moulding or shaping metals.—Dated November 26, 1852. Sealed January 19, 1853.

857. JOHN GEDGE, of Wellington-street, Strand, for Improvements in the mechanism of looms for weaving.—(Communication.)—Dated November 25, 1852. Sealed January 20, 1853.

113. BERNHARD HARCZYK, of Goodman's-fields, Middlesex, Gentleman, for An improved preparation or composition of colouring matter, to be used in washing or bleaching linen and other washable fabrics, and in the manufacture of paper and other substances.—Dated October 1, 1852. Sealed January 21, 1853.

453. FREDERICK RICHARDS ROBINSON, of Charlestown, United States of America, for An improvement in the gridiron or instrument for cooking steak or other articles by broiling.—Dated October 20, 1852. Sealed January 21, 1853.

489. PETER ARMAND LE COMTE DE FONTAINEMOREAU, of South-street, Finsbury, for Improvements in apparatus for essaying silk, cotton, and other similar fibrous substances.—Dated October 22, 1852. Sealed January 21, 1853.

528. HALSEY DRAPER WALCOTT, of Boston, Massachusetts, United States, for A new and useful or improved mechanism or contrivance for cutting button-holes or slits in cloth or other material.—Dated October 26, 1852. Sealed January 21, 1853.

632. NEHEMIAH HODGE, of North Adams, Massachusets, United States, for discharging water from the hold

of a navigable vessel.—Dated November 3, 1852. Sealed January 21, 1853.

654. RICHARD WRIGHT, of Greenwich, for Improvements in shafts and plummer blocks.—Dated November 5, 1852. Sealed January 21, 1853.

677. ANDREW ROBESON (junior), of Newport, in the State of Rhode Island, and United States of America, for An improved mode of bowking or bucking cloth.—Dated November 8, 1852. Sealed January 21, 1853.

712. CHRISTIAN SHARPS, of Hartford, United States, for Improvements in breech loading fire-arms.—Dated November 11, 1852. Sealed January 21, 1853.

579. ALFRED VINCENT NEWTON, of Chancery-lane, for Improvements in machinery for cutting corn and other standing crops.—Dated October 30, 1852. Sealed January 21, 1853.—Communication.

787. MOSES POOLE, of Serle-street, Middlesex, Gentleman, for Improvements in the manufacture of seamless garments and other seamless fabrics.—Dated November 19, 1852. Sealed January 21, 1853.—(Communication.)

789. GEORGE PERRY TEWKSBURY, of Boston, United States, for An improved life-preserving seat.—Dated Nov. 19, 1852. Sealed January 21, 1853.

791. RICHARD KEMSLEY DAY, of White Cottage, Plaistow, Essex, for Improvements in the manufacture of fuel for lighting fires.—Dated November 19, 1852. Sealed January 21, 1853.

794. MOSES POOLE, of Serle-street, Middlesex, Gentleman, for Improvements in cementing matters in the production of ornamental and other forms and surfaces.—November 19, 1852. Sealed January 21, 1853.—(Communication.)

817. JOHN PEPPER, junior, of Portsmouth, New Hampshire, United States, for A new or improved machine for knitting ribbed work.—Dated November 22, 1852. Sealed January 21, 1853.

820. SAMUEL HUNTER, of Ravensworth-terrace, Gateshead, Durham, for Improvements in anchors.—Dated November 22, 1852. Sealed January 21, 1853.

854. EDWARD AITCHISON, Lieutenant in the Royal Navy, of Manor-street, Chelsea, and JOHN EVANS, of Hamilton-street, Wandsworth-road, Boiler Maker, for Improvements in furnaces.—Dated November 24, 1852. Sealed January 21, 1853.

863. HENRY HOLLAND, of Birmingham, Umbrella and

Parasol Manufacturer, for Improvements in the manufacture of umbrellas and parasols.—Dated November 25, 1852. Sealed January 21, 1853.

867. CHARLES ILES, of Birmingham, for Improvements in the manufacture of chimney-pieces.—Dated November 25, 1852. Sealed January 21, 1853.

881. HENRY BOLLMANN CONDY, of Battersea, Surrey, for Improvements in the manufacture of acetic acid and acetates.—Dated November 26, 1852. Sealed January 21, 1853.

883. WILLIAM MASSINGHAM, of Ipswich, for Improvements in carriages and apparatus for carrying the dead.—Dated November 26, 1852. Sealed January 21, 1853.

897. GEORGE HOUGHTON, of High-street, Birmingham, for Improvements in the manufacture of college caps.—Dated November 27, 1852. Sealed January 21, 1853.

913. JAMES MURDOCH, of Staple-inn, Middlesex, for Certain improved materials for use in painting.—Dated November 30, 1852. Sealed January 21, 1853.—(Communication.)

939. JAMES NEWALL, of Bury, Lancaster, Railway Carriage Builder, for Improvements in breaks, machinery, or apparatus applied to railway and other carriages in motion, and in the mode or method of connecting two or more of such breaks together.—Dated December 3, 1852. Sealed January 21, 1853.

75. LAURENTIUS MATHIAS ELIER, of Denmark, Land Surveyor, for an apparatus to release or separate carriages on railroads in case of accident, giving at the same time a signal of distress. — Dated October 1, 1852. Sealed January 22, 1853.

86. DAVID DUNNE KYLE, of Albany-street, Regent's-park, for An improved method of excavating and removing earth.—Dated October 1, 1852. Sealed January 22, 1853.

232. JOHN PRESTWICH, the elder, SAMUEL PRESTWICH, and JOHN PRESTWICH, the younger, all of Farnworth, near Bolton, in the county of Lancaster, Spinners and Manufacturers, for Improvements in machinery or apparatus for cleaning and finishing woven fabrics.—Dated October 5, 1852. Sealed January 22, 1853.

412. JOHN HOWARD, of Bolton, Lancaster, Engineer, for Certain improvements in the construction of steam-boilers, or steam generators.—Dated October 16, 1852. Sealed January 22, 1853.

20. CHARLES FREDERICK BIELEFELD, of the Strand, Middlesex, for Improvements in constructing portable houses and buildings.—Dated October 1, 1852. Sealed January 25, 1853.

549. BRYAN DONKIN, the younger, of Bermondsey, Surrey, Engineer, and BARNARD WILLIAM FAREY, of Commercial-road, Old Kent-road, Engineer, for Improvements in machinery for measuring or marking off long lengths or continuous webs of paper or other materials into any required lengths, for the purpose of being cut or otherwise disposed of.—Dated October 28, 1852. Sealed January 25, 1853.

589. WILLIAM DANTEC, of Liverpool, for Improvements in preventing incrustation in steam-boilers.—Dated October 30, 1852. Sealed January 25, 1853.

907. JEAN DAVID SCHNEITER, of Paris, for Improvements in maps and charts.—Dated November 29, 1852. Sealed January 25, 1853.

927. ROBERT MILLIGAN, of Harden Mills, Bingley, York, for Improvements applicable to combing machinery. —Dated December 1, 1852. Sealed January 25, 1853.

951. ARTHUR WALL, of the East India-road, Middlesex, for Improvements in preparing sheet-metal for shipbuilding and other uses.—Dated December 3, 1852. January 25, 1853.

985. WILLIAM MAYO, of Berners-street, Middlesex, for Improvements in ball or float-valves and cocks.—Dated December 7, 1852. Sealed January 25, 1853.

363. JOHN CARTER, of Meltham, York, Spinner, for Improvements in the manufacture of woven fabrics.—Dated October 13, 1852. Sealed January 25, 1853.

691. WILLIAM GOSSAGE, of Widnes, Lancaster, Manufacturing Chemist, for Improvements in obtaining sulphur from certain metallic sulphurets.—Dated November 13, 1852. Sealed January 26, 1853.

PATENT SEALED UNDER OLD LAW.

THOMAS FILDES COCKER, of Sheffield, in the county of York, Wire Steel and File Manufacturer, for Certain improvements in annealing or softening metallic wires and sheets of metal; also in reducing, compressing, or drawing metallic wires; also in the manufacture of metal rolls.—Sealed January 11, 1853.—(*Six months.*)

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 3. Vol. XXI. ENLARGED SERIES.—MARCH, 1853.

Specification of the Patent granted to Alexander Bain, *of Beevor Lodge, Hammersmith, Gentleman, for Improvements in Electric Telegraphs and Electric Clocks, and in Time-keepers, and in Apparatus connected therewith.*— Sealed May 29, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— My invention consists,

First, of improvements in electric telegraphs, whereby a series of signs or indications are retained in sight for any desired length of time, whilst the electric apparatus which has caused such signs or indications to come into view is being used for producing other signs or indications.

Secondly, my invention consists of improvements in electric telegraphs, whereby a succession of the same or of different signs or indications are obtained without reversing the direction of the currents of electricity; and,

Thirdly, my invention consists of improvements in electric clocks and time-keepers, and apparatus connected therewith, whereby the clockwork or power employed to

give motion to a magnet is constantly controlled and regulated by a second system of clockwork. And in order that the invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

The first part of my invention has for its object so to arrange electric apparatus and mechanical apparatus that the electric apparatus having been the means of producing a sign or indication of such sign or indication, may be retained in sight, whilst the electric apparatus may be used in obtaining other signs or indications, thus ensuring the succeeding signs or indications being read correctly. This part of my invention is capable of assuming a great variety of forms, but I believe the arrangement shown in the drawing, and which I will now proceed to describe, will be found the most convenient.

Description of the Drawings.

Fig. 1, shows a side elevation of apparatus arranged suitably for carrying out the first part of my invention.

Fig. 2, is a cross section of part thereof through A, B.

Fig. 3, an end view.

Fig. 4, is a cross section through C, D.

Fig. 5, is a plan; and

Fig. 6, shows an elevation of three such apparatus in a circuit in the manner they would be arranged in case of having an intermediate station between two terminal stations. In each of these drawings the same letters are used to indicate the same parts.

The apparatus consists of two trains of wheels, each put in motion by its own spring; the one train is for giving motion to an endless band, which is arranged to have parts of one of its edges to be selected by the electric apparatus from other parts, and thus offer means of keeping in sight the parts so selected. The other train of wheels is caused to operate on an instrument which selects and retains in sight parts of the edge of the band before mentioned, the quantity or extent of the parts so selected depending on the electric apparatus, and the time the person operating retains the apparatus in position to cause a current of electricity to pass. *a*, is an endless band, which I prefer to be of woven fabric, woven with bristles as weft, and having at one edge the ends of the bristles projecting. This endless band, *a*, carried by two drums, *b*, *c*, the axis of the drum,

b, receiving motion from one of the trains of wheels, or it might be by other convenient means; but I believe clockwork to be the most convenient power for such purpose, as any slight inequality or difference of going in regard to the several systems of clockwork in a line of telegraph will not interfere with the correctness of the telegraphic indications made by each. When the apparatus is at work the endless band, *a*, is kept constantly moving; 1, is the spring barrel; 2, the chain; 3, the fusee; 4, cog-wheel or axis of fusee, which drives the pinion, 5, on the axis of the cog-wheel, 6. The wheel, 6, gives motion to the pinion, 7, on the axis of the cog-wheel, 8. The cog-wheel, 8, gives motion to the pinion, 9, of the cog-wheel, 10, which gives motion to the pinion, 11, on the axis of the fly, 12. And on the axis of the wheel, 8, there is a bevilled-toothed wheel, 13, which takes into and drives the bevilled-toothed wheel, 14, on the axis of the drum, *b*, and thus is the endless band, *a*, kept in motion; *d*, is a thin blade or plate, which is fixed to the standard, *e*, *e*, so that it is retained straight; and according to the length of this plate and the length and speed of the endless band, *a*, so will be the length of time that signs or indications are retained in sight, and supposing several such instruments are used in an electric circuit, like signs will be at the same time on each of the plates, *d*, by which not only will the sender of the telegraphic communication have before his eyes several succeeding signs at the same time, but such will also be the case with the receivers of the communication at distant stations. And in order to make this more completely understood I will now describe the action of the electric apparatus by which the actuated and pointed end of the plate, *d*, is caused to operate in separating or selecting more or less of the fringe of the band, *a*, at intervals, in order to produce alphabetical signs or indications, the signification of which will be arranged according to any code parties may compose; 15, is a spring barrel of the second arrangement of clockwork; 16, is the fusee, on the axis of which is a cog-wheel, 17, which takes into and drives the pinion, 18, on the axis of the cog-wheel, 19, which wheel, 19, takes into and drives the pinion, 20, on the axis of the cog-wheel, 21, which wheel, 21, takes into and drives the pinion, 22, on the axis of the cog-wheel, 23, which wheel, 23, takes into and drives the pinion, 24, on the axis of the excentric, 25, which excentric, by the connect-

ing-rod, 26, moves the pointed end of the plate, *d;* and it will readily be understood that so long as the end of the plate, *d*, is not pulled inwards, as hereafter explained, that it will remain stationary, and the fringe at the one edge of the band, *a*, will move behind the plate, *d;* and it will further be readily understood that if the pointed end, d^1, of the plate, *d*, be pulled in towards the band, *a*, so that the point, d^1, will pass behind the fringed edge of the band, *a*, the fringed edge will pass in front of the plate, and will continue to pass in front so long as the point, d^1, is retained out of the straight line; but immediately the end, d^1, assumes the straight line the fringe will again move at the back of the plate, *d*, only so much of the fringe as has been selected remaining in front of the plate, *d*, and such selected portions of the fringe will remain in sight till they come to and pass beyond the end, d^2, of the plate, *d*. And it will be obvious to persons accustomed to the preparations of codes for electric telegraphs that various alphabets or codes may be composed and used according to the signification given to the larger and smaller quantities of the fringe, which are selected in succession and remain in sight, as above explained. In order to cause the end, d^1, of the plate, *d*, to be drawn or moved inwards, so that it may come behind the passing fringe of the band, *a*, the electro-magnet, *f*, is used, which acts on the keeper, *g*, on the lever, *h*, such lever being constantly acted on by the vulcanized india-rubber or other spring, *e*, to remove the keeper, or armature, *g*, when a current of electricity is not passing; *j*, is a finger key by which metallic connections are made and broken, as is well understood, and the quantity of fringe which will at any time appear in front of the plate, *d*, will depend on the time that this key is depressed, for so long as there is metallic contact and the circuit is complete, so long will the end, d^1, of the plate, *d*, be drawn behind the fringe by the electro-magnet, and the clock-work by which such movement of the end, d^1, of the plate, *d*, is accomplished, as above explained, will be stopped, and such will also be the case so long as there is no electric circuit complete. It will, therefore, be understood that when a sign or indication is to be transmitted the communication will successively depress the key, each depression being for a longer or shorter time, by which the fringe of each instrument in the circuit will be caused to appear in front of the plate, *d*, in longer or shorter quantities, accord-

ing to the arrangement of code. On the axis of the excentric, 25, is a fork, *k*, which is intercepted by a projection from the lever of the keeper or armature, which in its moving up and down intercepts one or other of the prongs of the fork. By the arrangement shown in the drawings the batteries, z, z, fig. 6, are constantly in action, and in order to maintain a complete circuit through an instrument, when that instrument is not the communicating instrument, the key is at all times kept down by the screw, k^1.

From the above description, aided by the drawings, the nature and mode of carrying out the first part of my invention will be seen. I do not, however, confine myself to the mode shown and explained, as the same may obviously be greatly altered and different apparatus used, without departing from this part of my invention, so long as the signs obtained in succession by the electric apparatus (by the selection of parts of a mechanical system) be retained mechanically in sight after selection.

I will now proceed to describe the second part of my invention.

Fig. 7, shows a front view of an apparatus arranged according to this part of my invention.

Fig. 8, is a plan thereof.

Fig. 9, shows a side view.

Fig. 10, shows another front view, with the dial or face removed, in order to show the screen which works behind the dial or face.

Figs. 11, 12, 13, show three views of the face or dial with the screen behind it, in the three positions it is caused to assume when working. *a*, is an axis which, when the instrument is at work, is kept constantly rotating by suitable clockwork, which I have not thought it necessary to show in the drawing. On the axis, *a*, is a bevilled-toothed wheel, which takes into and drives another bevilled-toothed wheel on the axis, *b*. On the axis, *b*, is a disc, *c;* the object of this rotating disc is that when the keeper or armature, *d*, of the electro-magnet is attracted by its electro-magnet, *e*, it shall cause the screen, *f*, to come in contact with and be moved by the rotating disc, *c*, a shorter or a greater quantity, according as the electric circuit is kept closed, a longer or shorter time. The screen, *f*, is carried by the arm, f^1, which moves on an axis, *g*, on the armature or keeper of the electro-magnet; and in order that the

screen shall again assume its proper position, after it has been moved, the spring, *h*, is used, and the projection, *i*, and stop, *j*, are employed to prevent the spring, *h*, moving the screen too far. The keeper or armature of the magnet is mounted on the arm, *k*, which is fixed on the axis, *l*, which is constantly drawn on by the spring, *m*, so as to remove the armature or keeper from the magnet when the electric circuit is not complete. In using this instrument, only two signs are obtained, and it is by the order in which they are caused to appear that the desired signification according to a code will be obtained, and in this respect the instrument is similar to a single-needle telegraphic instrument, which moves to the right and left of a zero point, by reversing the direction of the currents of electricity; but by the arrangement above shown and described, the electric currents at all times pass in the same direction. The two signs obtained by this instrument are, first, when the slot or opening, *n*, in the dial is half covered; and, secondly, when the slot is open or wholly covered; and the half movement or whole movement of the screen will depend on whether the circuit is made and instantly broken, or whether it is retained for a time to allow of the revolution of the disc to act for such a time on the screen as to move it the whole length of the slit or opening in the face or dial.

I will now proceed to describe the third part of my invention.

Fig. 14, is an elevation of several coils of wire, each having a bar or core of soft iron therein.

Fig. 15, shows a plan thereof.

Fig. 16, a plan in section; and

Fig. 17, an elevation in section. These coils of insulated wire are fixed in a circle, as shown; and on a central axis, *a*, are fixed, back to back, two magnets having their similar poles upwards and downwards, as shown; and rotatory motion is to be communicated to the axis, *a*, by means of a suitable maintaining power, which I prefer to consist of strong clockwork actuated by a weight or weights, as is well understood. In arranging the coils of wire, one end of the wire in each coil descends into the earth, and is connected to a plate buried in earth, and so as to be constantly moist, as is well understood. The other end of the wire of each coil is to be kept well insulated, and to be connected in the usual manner with any desired number of electromagnetic clocks or time-keepers, or indicators of time, as is

well understood; and having passed from the last of its group, it is caused to descend into the earth, and be connected with a metal plate constantly subject to the moisture thereof, or the wire may be in metallic connexion with gas or water pipes under the earth, or by a return wire, as is well understood.

Fig. 18, shows a diagram by which the wires leading from the several coils are indicated, communicating with six groups or separate systems of clocks to each coil of wire, and it also shows how I prefer to arrange apparatus for governing or controlling the working of the maintaining-power. I would remark, that it is not new to give motion by clockwork, or maintaining-power to magnetic apparatus for obtaining electricity for working clocks, as the same has been before described by me in a former patent; but the clockwork power was not regulated or controlled in its action, and it is difficult to have sufficiently powerful works to drive the magnets, and yet also keep good time, by one arrangement of clockwork mechanism; and my present improvements have, as above stated, for their object the regulating and governing the action of the actuating clockwork or power by means of a second or regulating clock, which being made in the best manner will go correctly, as it will only have to remove at intervals a slight impediment or stop to the going of the other clockwork; and I prefer that the axis, *a*, of the magnets, *b*, *c*, should be arranged to make one revolution per minute, and that the regulating clock should remove a detent or stop from the fly of the actuating or driving system of clockwork. I have not thought it necessary to show the two systems of clockwork, as a workman will readily arrange such works. *d*, is a wheel of the regulating clock, which is arranged to make a revolution in a minute; *e*, is a pin or projection thereon, which coming against the lever, *f*, moves it away, by which means the other end of the lever, *f*, is moved away from the end of an arm, *g*, on the axis of the fly of the other system of clockwork, and allows that system of clockwork to come into motion; and by the axis, *h*, and bevelled-toothed wheels, *i*, *j*, to give motion to the axis, *a*, of the magnets, *b*, *c*. On the axis, *h*, is a notched disc, *k*, within which an arm or detent, *l*, rests, as is shown. The detent or arm, *l*, moves on an axis, *m*, fixed to the framing; and the axis of the lever, *f*, is fixed on the top or nave of the arm or detent, *l*;

and as the axis, *h*, which is put in motion by the stronger system of clockwork, at a speed of one revolution in less than a minute, the working will be as follows:—when the pin, *e*, comes in contact with the lever, *f*, and moves its other end out of the way of the arm, *g*, the stronger or actuating clockwork will come into action, and the disc, *k*, will by its revolution lift the arm, *l*, out of its notch, and the arm will remain out and resting on the periphery of the disc till the axis, *h*, has made a complete revolution, when the arm or detent, *l*, will fall into its notch in the disc, *k*, and the lever, *f*, will intercept the arm, *g*, of the actuating clockwork, and that system of clockwork will stop till again released, as above explained. I would remark, that I do not confine myself to this arrangement of mechanism for causing the more powerful of the two systems of clockwork to be controlled or regulated by the other clock, as the same may be varied without departing from the peculiar character of this part of my invention, which consists of giving motion to the magnet, or magnets, used by one system of clockwork or actuating mechanism, and regulating such actuating mechanism by means of a regulating clock or time-keeper.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that what I claim is,

First, the mode of arranging or combining apparatus herein described, whereby mechanical signs or indications brought into view by electric apparatus are kept mechanically in view for a time.

Secondly, I claim the combining apparatus acting by electric influence, as herein explained, so as to obtain successive signs, without changing the direction of the currents of electricity; and

Thirdly, I claim the improvements herein described in electric clocks and time-keepers, and apparatus connected therewith.—In witness, &c.

ALEXANDER BAIN.

Enrolled November 29, 1852.

Specification of the Patent granted to Moses Poole, *of the Patent Office, London, Gentleman, for Improvements in Reaping and Mowing Machines, and in Pulverizing Land.*—Sealed July 6, 1852.—(Communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— The invention consists,

First, of an improved method of arranging the cutters of reaping and mowing machines, whereby they are rendered less liable to become choked by the stalks or portions of corn, grass, or other matters getting between the blades or cutting instruments and the supporting points or guards.

Secondly, the invention consists of a peculiarly constructed roller or clod-crusher, in the formation of which I employ several thin metal discs, which are kept at suitable distances apart on an axis by rings or other suitable instruments. The depth to which the several discs enter the earth is governed by wheels which run on the land. To this apparatus are applied scrapers or knives of suitable forms and dimensions to enter between the discs, to remove from them the earth which is cut and raised by them.

Description of Drawing A.

Fig. 1, is a plan; and

Fig. 2, a side view of a reaping machine having the improvements applied thereto.

Fig. 3, is a section of part of the apparatus on a larger scale.

Fig. 4, is another section of similar parts of a reaping machine, as heretofore constructed. *a*, is the cutter-rod or bar, which receives a quick reciprocating motion by means of the crank axle; *b*, *b*, are the guards, which have recesses, *c*, formed in them, into which such portions of the corn, grass, or other materials being cut may pass, and which without such provision would tend to clog or choke the cutters and their guards, *b*. The recesses, *c*, are at all times cleared of any such materials by the action of the projections, a^1, fixed to the underside of the cutter-bar, *a*; the arrows in the drawings, figs. 3 and 4, denote the direc-

tions in which the materials escape, and it is the having of the recess, *c*, which constitutes the improvement of this machine.

Fig. 5, is a plan; and

Fig. 6, a side view of a machine constructed according to this invention, suitably arranged for cutting or mowing grass. *a*, *a*, is the framing; *b*, *b*, are the running wheels by which the machine is carried, and are fixed on an axis, *c*. This machine is worked by a crank handle at *d*, on the shaft or axis, *e*, carried by the standards, a^1, of the framing; on the shaft or axis, *e*, is a bevilled-toothed wheel, *f*, taking into and driving the bevil pinion, *g*, on the crank axis, *h*, working in bearings attached to the framing, *a;* the crank axis, *h*, is connected to one end of the bar, *i*, by the connecting rod, *j;* the bar, *i*, vibrates on a fixed centre, *k*, and at its outer end is connected by a pin, *l*, to the cutter rod, and thus is motion given to the cutting instruments, which with their supporting points or guards are similar to those described in respect to fig. 3, therefore need no further description. On the shaft or axis, *e*, a band-wheel, *m*, is affixed, around which and another band-wheel, *n*, on the axis, *c*, a band is passed, by means of which the machine is caused to travel forward as it performs its work. The novelty of this machine is its general combination, as shown.

I will now describe the second part of the invention.

Description of Drawing B.

Fig. 1, is a plan.

Fig. 2, a side view; and

Fig. 3, a back view of a machine constructed according to the second part of the invention, which has for its object the pulverizing of land, by causing the land to be cut and raised by a series of parallel discs, and removed therefrom by scrapers. *a*, *a*, is the framing, having shafts, *b*, *b*, firmly fixed thereto, by which to attach the horses or cattle; *c*, *c*, are a series of thin metal discs, which are shown as placed at regular intervals; this may be varied, and they may be at different distances.

The discs are kept in their proper positions on the axis, *d*, by rings or washers, *e*, *e*, of less diameter than the discs, *c*, *c; f*, *f*, are the wheels which govern the extent that the discs, *c*, *c*, shall enter the earth; *g*, *g*, are a series of knives or scrapers attached to a cross piece of the framing, as

shown, and are firmly secured in their positions by bolts and nuts, which pass through slotted holes in the cross framing, the slots admitting of the cutters or scrapers being adjusted properly by being brought closer to the washers or rings, *e*, *e*, or farther from them, as found necessary.

The discs may, if desired, be placed in sets at regular or irregular intervals on the axis, and the earth scraped from between the discs removed by scrapers, such as are shown, or their shape and position may be varied.

The novelty of this machine consists of the combined use of parallel discs and scrapers, the depth to which the discs descend into the land being controlled by the wheels on the land.—In witness, &c.

MOSES POOLE.

Enrolled January 6, 1853.

Specification of the Patent granted to MOSES POOLE, *of the Patent Office, London, Gentleman, for Improvements in Boots, Shoes, Clogs, and other similar Articles.*—Sealed July 15, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention consists of the improvements hereafter described in the manufacture of boots, shoes, clogs, and other articles.

Description of the Drawing,

which shows a plan of the underside of an in-sole constructed according to the invention, which I prefer to be of india-rubber, or it may be of india-rubber mixed with other materials, or of other materials alone, provided the material will not be injured by the heat to which it will be subjected in the process of converting india-rubber by what is now commonly called "vulcanizing." This in-sole has numerous small holes formed through it for the purpose of ventilating the foot when walking, and in order that there shall be a space between the in-sole and the out-sole, and yet that the tread may be solid and sufficiently firm, I cause the out-sole to be supported at intervals with vulcanized india-rubber, which will give way to the tread

and recover itself when released from pressure, by which means air from the external atmosphere will be alternately received into and driven from the space between the two soles. The upper surface of the in-sole is to be covered with flannel or other cloth, the under surface of the foot will thus continually receive ventilation. The out-sole is fastened to the in-sole by any convenient manner, and may be made of any suitable material, but it is preferred that it should be made of india-rubber, suitably prepared for making a hard substance resembling whalebone, that is, one part of sulphur is to be used for each two parts of india-rubber. The upper to be used in combination with such an in-sole and out-sole of a boot, shoe, clog, or such like article, may be of any suitable material, but if connected with the india-rubber before, the same is subjected to heat for the purpose of vulcanizing the india-rubber; the fabrics or materials employed are, as is well understood, to be capable of bearing the heat necessary for this process without injury. It is preferred that the uppers should be of woven fabric, (either wholly or partly rendered elastic or not by the use of india-rubber,) and fixed to the in-sole by cementing, which is not new, as such means of connecting these parts have been before resorted to, but it is preferred that for some height above the sole the upper should be composed of or covered with india-rubber prepared for vulcanizing, so as to render the boot, shoe, or other article waterproof to that extent. When letting in gores at the ancles of high shoes or boots to make them elastic at those parts, knit or looped fabrics coated with india-rubber, suitably prepared for being vulcanized, are employed; the elasticity of the knit or looped fabric being retained in the horizontal direction of each gore, such gores of knit or looped fabric being introduced and sewn in the opening of "an upper." All these parts may be put together before the process of "vulcanizing," the parts composed of india-rubber may be cemented together by india-rubber cement, the india-rubber used for such parts being previously mixed with sulphur, or matters containing sulphur, or capable of giving off sulphur vapours when subjected to the heat necessary to produce the change called "vulcanization." In place of applying the out-sole before vulcanizing the other parts, the parts of the under surface of the in-sole may be prepared to have the out-sole applied after the process of vulcanizing has been performed, in which case

strong fabric or cord (if the sole is to be cemented or sewed) may be applied to the india-rubber round the outer edge of the in-sole, and caused to be combined or fixed thereto by cement, which fabric or cord, after the india-rubber has been vulcanized, will admit of the out-sole being subsequently sewed or cemented, or in place of fabric or cord being used, hard material, such as wood, may be embedded in the india-rubber of the in-sole, and the out-sole, whether of leather or of the hard material produced from india-rubber combined with sulphur, may be fixed by screws or other means. Another mode of fixing an out-sole or heel where vulcanized india-rubber is employed for the in-sole, is by embedding surfaces of the hard horny or whalebone-like substance produced by combining india-rubber with sulphur (with or without other matters) and subjecting the same to heat; the india-rubber of the in-sole is to be prepared for the process of vulcanization, the hard surfaces for the sole and heel are then to be embedded, and when the process of vulcanization has been perfected the vulcanized edges of india-rubber will hold the hard substance securely. In these cases the hard material so to be embedded is first made and hardened by heat before being embedded in the prepared india-rubber. An air passage is to be provided, and this can most conveniently be done at the heel, as shown, and which should be provided with a plug to close it when in use in very wet weather, or the entrance of the air passage may be carried higher up the heel by a small flexible tube. The boot, shoe, clog, or other such-like article, is then to be subjected to heat in order to convert the india-rubber, as is well understood.

Having thus described the nature of the invention, and the manner of performing the same, I would have it understood that I do not confine myself to the several details as herein described.

But what I claim is,

The combining materials as herein described, when manufacturing boots, shoes, clogs, and other similar articles. —In witness, &c.

MOSES POOLE.

Enrolled January 15, 1853.

Specification of the Patent granted to JAMES TIMMINS CHANCE, *of Handsworth, in the County of Stafford, Glass Manufacturer, for Improvements in the Manufacture of Glass.*— Sealed March 29, 1852.—(Partly communicated.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— The invention consists of applying anthracite or stone coal in the manufacture of glass. And in order that the invention may be most fully understood, I will proceed to describe the means pursued by me. It is well known that bituminous coal in burning gives off products which are injurious to the colour and character of glass when melted in open vessels, and it is with a view to avoid or diminish such injurious effects that these improvements are devised; and the same are carried into practice by varying the construction of glass furnaces, in such manner as to employ the fuel known as anthracite or stone coal.

Description of the Drawing.

Fig. 1, is a vertical section.

Fig. 2, is also a vertical section taken at right angles to that at fig. 1; and

Fig. 3, is a horizontal section taken through the upper part of the furnace, which is arranged for four pots; but this may be varied.

The furnace is very similar to those heretofore used, and the fuel is supplied at the feed holes, *a, a,* which are kept closed by the fuel outside, which from time to time is forced into the furnace. I prefer the bed of the furnace to be closed, which may be done by "loaming" over the fire bars, or by having sliding plates below them, or otherwise. *c,* is the ash-pit or space below the fire; *d, d,* are pipes, through which air is forced by a fan or other blower valves, or other suitable means, being used to regulate the quantity of air admitted to the fire, as may be required. I would mention that it has not been found necessary to heat the air; but if desired, a proper air-heating apparatus may be introduced between the blowing machine and the furnace; *e, e,* are the pots, which are of the ordinary construction.

It is desirable that the depth of grate room below the

entrance of the air-pipes should be sufficient to hold an accumulation of ashes, and also that the sirges should be high enough above the air-pipes to allow the flame to impinge on the lower as well as on the upper parts of the pots.

I would state that, although I believe the arrangement shown and above described to be the best, I do not confine myself thereto, as the same may be varied, so long as the furnace employed is suitable for burning anthracite or stone coal.

What I claim is, the application of anthracite or stone coal in the manufacture of glass.—In witness, &c.

JAMES TIMMINS CHANCE.

Enrolled September 29, 1852.

Specification of the Patent granted to GEORGE HINTON BOVILL, *of Abchurch-lane, in the City of London, for Improvements in manufacturing Wheat and other Grain into meal and flour.*—Sealed July 15, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The first part of my invention consists in driving millstones, by straps or bands, from a central horizontal shaft acting on drums or riggers on the stone spindles placed on either side of such horizontal shaft.

Second, drying flour and meal by steam or hot-air cylinders or apparatus, instead of the old method of kiln-drying the corn.

Third, subjecting flour to the operation of steam to restore or give moisture, given up in grinding or otherwise.

Fourth, washing and then drying corn by currents of air.

Fifth, the application of exhausting or blowing machinery, either separately or in combination, to millstones, when such millstones are made with openings covered with wire gauze, to take out the flour from between the grinding surfaces in the process of grinding.

Sixth, the application of exhausting apparatus to millstones when ventilating horns or such like instruments are used, revolving with the stones. And in order that my

invention may be fully understood, and readily carried into effect, I will proceed to describe the drawings.

Description of the Drawings.

Sheet A, fig. 1, shows my improved method of driving millstones, by means of half-crossed straps acting from a central horizontal shaft between the ranges of millstones to be driven. A, represents the driving shaft; B, the driving riggers on ditto, giving motion to the straps, C, C, which are guided by tightening pulleys, D, D, and which give motion to the stone spindles, E, E, by means of pulleys, F, F, on ditto; G, G, are loose pulleys, on which the straps, C, C, work when the stones are out of gear; H, H, the bed stones.

I am aware that millstones have before been driven by straps from a horizontal to a vertical stone spindle, but such applications have been on one side of the horizontal shaft only, causing great friction and wear on the bearings; I only claim, therefore, the arrangement herein described, of driving the stones on both sides of a central horizontal shaft.

Fig. 2, represents my improved method of drying flour by means of steam and hot-air cylinders. A, A, represents a double-cased revolving cylinder lying at a slight inclination and supported on a hollow spindle, B, which by means of a pipe, C, is supplied at its upper end through a stuffing-box, D, with steam or hot air, as shown by the arrows, which is conducted by hollow arms, E, E, into the space between the double sides of the cylinder, A, first mentioned. When steam is used the water produced from the condensation of the steam is taken out at the lower end of the cylinder by means of small cups or buckets, F, F, in the space between the double sides of the cylinder, which by means of other hollow arms, G, G, deliver it into a pipe, H, working in a stuffing-box, I; J, J, is a fixed cylinder on the outside of the double-cased cylinder, A, first mentioned, and is supplied with air from a blowing machine by means of an air-pipe, K. This air is prevented from escaping at the ends of the cylinder by stuffing-boxes, L, L, L, L; it is therefore compelled to fill the space between this stationary cylinder, J, and the cylinder, A, and thus to become heated by its contact with the outer case of the cylinder, A; it then passes by means of large hollow arms, M, M, into a hollow spindle, N, from which by means of small holes, O, O, O, &c., it escapes into the interior of the double-cased

cylinder, A; P, P, are stops in the hollow spindle to prevent the communication between the steam and the heated air.

Q, is a driving-rigger with various speeds in it so as to cause the cylinder, A, to revolve with more or less rapidity, according to the amount of moisture in the flour or meal to be dried.

R, represents a hopper through which the flour to be dried is fed into the interior of the doubled-cased cylinder, A, where by the revolution of the cylinder all the particles of the flour are successively presented to the heated surface of the cylinder, and to the hot air which enters into it through the holes, O.

S, represents the shoot through which the dried flour escapes. The arrows indicate the direction of the steam, hot air, and water from condensation.

This machine may be used with the double-cased cylinder, A, alone, with the arrangement for blowing hot air into the interior, or it may be used with the hot air applied to the outer case only, without the internal case of double cylinder, A. The air would be heated by some of the well-known processes for that purpose.

Fig. 3, represents my improved method of giving moisture to flour of which it may have been deprived in the process of grinding or otherwise.

A, is a revolving cylinder lying at a slight inclination carried on a hollow spindle, B, B, which by means of a pipe, C, with a regulating cock, can be fed with any required amount of steam which by small holes, D, D, &c., escapes into the cylinder, A, first mentioned.

E, is a driving rigger with various speeds on it, so as to cause the cylinder, A, to revolve with more or less rapidity according to the amount of moisture which it may be desired to impart to the flour.

F, represents a hopper through which the flour to be damped is fed into the interior of the cylinder, A, where by the revolution of the cylinder all the particles of the flour are successively brought into contact with the steam escaping from the holes, D, D.

G, represents the shoot through which the damped flour escapes. The arrows indicate the course of the current of the steam.

Figs. 4 and 5, represent my improved method of cleaning wheat. Fig. 4, shows a machine which I call a washer. A,

is a fixed vertical cylinder of cast iron or other suitable material closed at bottom and open at top, and provided with a step, B, carrying a vertical spindle, C, to which motion can be given by a bevil pinion, D, which is supposed to be driven by a wheel, or the spindle may be made to revolve in any other suitable manner; E, E, E, &c., arms or blades attached to the spindle which pass very closely to F, F, F, &c., also arms or blades, but fixed to the stationary cylinder, A; G, is a circular tank round the top of cylinder, A, provided with a wire grating, H; I, I, outlet pipes; a proper amount of wheat is introduced into the interior of the cylinder, A, and water is then let in so as to fill the cylinder until it overflows on the annular grating, H; the light grains and impurities contained in the wheat are separated from it by the agitation caused by the rapid revolution of the spindle, C, with its blades, E, E, and rising to the surface flow over the edge of the cylinder, A, pass the grating, H, which only retains any portions of grain that may have got mixed with them, and thus escape by the waste water pipes, I, I; as soon as the wheat is judged to be sufficiently clean, J, a slide at bottom of the cylinder, A, is opened, and the wheat and water escape together by a shoot, K, into a screen, L, through which the water passes, leaving the washed wheat to fall into the machine.

Fig. 5, which I call a dryer; A, a cylinder formed of open framework covered with woven wire or perforated plate containing a spindle, B, driven at great velocity by any ordinary means, supported on which are fan blades, C, C, C. As the damp corn enters the top of the cylinder it is set in rapid motion by the fan blades revolving at considerable velocity, which driving a powerful current of air through the perforated cylinder, evaporates the moisture remaining on the corn by the time it has passed to the bottom of the cylinder which may either be made fixed or to revolve.

Figs. 1 and 2, sheet B, represent the application of the exhausting apparatus in elevation and plan applied to mill stones when pieces of perforated plate or woven wire in the bed stone are employed to take out the flour from between the stones in the process of grinding.

The same letters refer to the same parts in both figs. A, the running stone; B, the stone case; C, the spindle; D, the bed stone with pieces of woven wire or perforated plate,

E, E, E, inserted over cavities, F, F, in the bed stone; G, a hopper of iron or other suitable material attached to the underside of the bed stone and covering the whole of the apparatus, F; H, an outlet from G, leading to an exhaust apparatus and outlet, I; for meal or flour the entrance of air may be prevented by a balance throttle valve or other suitable means. Wire gauze or perforated plates covering openings in mill stones for relieving the grinding surfaces of the flour, I am aware has before been used, but such gauze or perforated plates have hitherto been found to clog or choke, and I would have it understood that this part of my invention consists in the application of currents of air produced either by blowing or exhausting machinery, and either separately or in combination made to pass between the grinding surfaces of the mill stones and down through the perforations, E, E, E, by which means the flour is cooled and dried and easily dressed out through such perforations assisted by the current of air. I do not claim the application of gauze wire or perforated plates to mill stones except in combination with currents of air. It is unnecessary to show in drawings the ventilating horns on the mill stones to which the sixth part of my invention relates, as they are well known to all millers and millwrights; and I would have it understood, that I am aware that exhaustion has before been applied to millstones in various ways, and also in combination with a blast of air as previously patented by me; and in order that this part of my invention may be fully understood, I only claim the application of exhausting machinery to the millstones when the ventilating horns, or such like instruments, are employed revolving with the stones, and by which combination considerable advantage is gained.

Having now described the nature of my invention and the means for carrying the same into effect, I would have deunderstood, that I do not confine myself to the precise witails so long as the general principles be retained.—In witness, &c.

GEORGE HINTON BOVILL.

Enrolled January 15, 1853.

Specification of the Patent granted to JOHN FRANCIS EGAN, *of Covent Garden, for Improvements in the Manufacture of Sugar.*—Sealed July 20, 1852.—Communication.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention consists, first, in the construction and arrangement of apparatus used in the manufacture of sugar; and secondly, the invention consists in the application of certain matters in the treatment of cane juice in the manufacture of sugar; and in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawings.

Fig. 1, shows a plan partly in section;

Fig. 2, a longitudinal section;

Fig. 3, a transverse section through the line, 1, 1, of the apparatus used in carrying out the first part of the invention; and

Figs. 4, 5, and 6, show separate views of the cooler and instrument for removing the scum from the surface of the coppers. A spout, D, with a lid, D', is placed in front of the fourth and fifth coppers, into which the thick glutinous and other matters that separate from the cane juice during its defecation, are brought unbroken from the surface by means of a kind of rake, P, into the spout, D, and flow entirely away. The liquor is thus all but completely clarified, and during its further ebullition it is cleaned by what are generally called brushes, which, however, instead of carrying the impurities as formerly, from copper to copper, convey them into canals, B, also with lids attached between the second and third, and third and fourth coppers, which impurities, coming from the first, second, and third copper, together with some now partially evaporated juice, flow into the fourth or fifth copper by the longitudinal canal, B', according as the one or the other is being filled with cold liquor from the mill, there being stops or sluices, S, to direct it into one or other as desired. The coolers, C, shown at figs. 4 and 5, into

which the concentrated syrup has been struck, or skipped, contain a longitudinal division by means of boards or planks, c^1, and have besides holes in the bottom to which plugs, c^2, are fitted. These plugs and boards are removed after the sugar has granulated, to facilitate the separation of the crystallized from the uncrystallized saccharine matter; the latter, however, flowing through the plug holes is conveyed by canals, c^3, to other coolers, and there deposits a further amount of sugar on the addition of to each cooler of molasses, a strike of highly concentrated syrup.

The second part of the invention consists in the application of materials in the manufacture of sugar attended with scarcely any expense, and entirely innocuous, which materially assists in depurating the cane juice; and to which, with the mechanical arrangement before described are due, the increased return in quantity, and the extraordinary improvement in quality. The defecating agent used, is a combination of the expressed juice of the plantain tree ten gallons, and quick lime seven pounds, thoroughly mixed, and allowed to stand until subsidence takes place, when it is very carefully drawn off, and one ounce of flour of sulphur added to every six gallons. After the first thick scum coagulated by the action of heat has been removed in the fourth or fifth copper from the cane juice, two or three quarts of the above liquor are added, and immediately a large amount of impurities rise to the surface, and are carried rapidly and efficiently away by the rake or instruments used for the purpose. This depurating substance, containing a considerable amount of lime, does away in many instances with the use of temper; however, the practical and intelligent sugar-boiler will readily understand that from the nature of the soil the different varieties of cane and their various states of maturity; the quantity of the defecating agent and temper necessary must vary according to circumstances, and his own practical knowledge will at once point out the amount required. The object proposed by this simple, inexpensive, but efficient improvement (mechanical and chemical) is to remove completely and at as early a period as possible all the foreign noxious impurities before they have had time to re-act on the saccharine matter contained in the juice of the cane, and as I believe by experience it will be found that the object is realized, the conclusion must at once be evident

that the quality of the sugar is thereby improved and its quantity considerably augmented.—In witness, &c.

JOHN FRANCIS EGAN.

Enrolled January 20, 1852.

Specification of the Patent granted to EDWARD GEE, *of Liverpool, Merchant, for Improvements in Apparatus for Roasting Coffee and Cocoa.*—Sealed May 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.

Description of the Drawing.

Fig. 1, is a front elevation of a roasting apparatus containing the proposed improvements;

Fig. 2, is a side elevation of the same; and

Fig. 3, is a plan corresponding to figs. 1 and 2.

This invention consists of an outer cylinder or casing, A, fixed on a base or sole plate, B, and containing in the interior a conical fire-box or close chamber, C, (the cylinder is shown broken at certain places in figs. 1 and 2, in order to show the various parts contained in the interior of the apparatus,) underneath a perforated plate or surface, D, on which the matters to be roasted are placed; a flue, E, allows the products of combustion to escape from the fire-box, the latter being also formed with an aperture in front (to receive the fuel), against which is placed a cover or door, F, fig. 1, hinged to the cylinder, for regulating the application of heat to the perforated plate above named. The fire chamber, C, is supported on a stand, G, resting on the base plate, and a tray, H, fig. 1, is placed upon the latter immediately underneath the fire-grate, to form an ash-pit.

The top of the outer-cylindrical casing, A, projects above and surrounds the perforated plate or surface, there being at one part of the circumference an opening and shoot, a^1, furnished with a door, I, removed in fig. 1, but shown in detail at figs. 3, 4, and 5, hinged to the cylinder so that when the door is opened or raised by the handle, J, and

retained in that position by means of the pall, K, and ratchet, L, the matters when roasted can be removed from the surface of the perforated plate.

In order to move or turn over the coffee or cocoa when being roasted, there are inclined blades or instruments, M, figs. 3, 6, and 7, hinged on the arms, N, fixed on an upright central axis, O, which is caused to rotate on motion being communicated by the fly-wheel, P, placed on the shaft, Q, to the bevil-wheels, R and S; the upright axis, O, shown at figs. 2, 3, 6, and 7, being supported at the upper and lower extremities by means of brackets, T and V, attached to the circumference of the cylinder, the former bracket also supports one end of the shaft, Q, the other extremity being secured in its position by a bracket, V, attached to the cylinder.

When the process of roasting is complete, the door, I, is opened in the manner above described, and the inclined blades cause the coffee or cocoa to be discharged through the opening and shoot from the surface of the perforated plate into the vessel intended for its reception.

Having thus described the nature of my invention, I wish it to be understood that I do not strictly confine myself to the details thereof, so long as the peculiar character of the invention is retained.

But what I claim is for the improved combination of apparatus for roasting coffee and cocoa.—In witness, &c.

EDWARD GEE.

Enrolled November 1, 1852.

Specification of the Patent granted to WILLIAM ACKROYD, *of Berkenshaw, near Leeds, for Improvements in the Manufacture of Yarns and Fabrics, when Cotton, Wool, and Silk are employed.*—Sealed July 31, 1852.

To all to whom these presents shall come, &c., &c.—The improvements consist in combining cotton and wool, or wool and silk, when they have been combed, or combining them uncombed and then combing them; and the use of these so combed and combined in the manufacture of fabrics.

In order that my invention may be most fully understood

and readily carried into effect, I will proceed to describe the means pursued by me when cotton and wool are to be combined. I employ them, as nearly as may be, of the like staple or length of fibre, and I can mix them either before or after combing them. I prefer to mix them before they are combed (and this may be done by carding them together or separate), and then to feed the carded fibres together into a combing machine, and I cause them to be combed together. The act of combing (whether they have been previously carded or not) and the subsequent processes of preparing for spinning will more intimately blend the two descriptions of fibres, or the wool only may be combed and carded, cotton combined or mixed therewith in preparing them for spinning. The relative quantities of the wool and cotton may be greatly varied, and the effects producible by different mixtures will also greatly vary, particularly if the yarns or fabrics made therefrom be dyed or printed, as different effects of colour will result than when using all cotton or all wool, and the manufacturer will cause the one class of fibre to predominate, or the other, according as he wishes the yarns and fabrics more nearly to approach, in character and appearance, yarns or fabrics made wholly of the one or other fibres. In like manner may wool and silk waste be employed together, they being first mixed and then combed together, or combed separately and mixed by the subsequent processes of preparing for spinning. I would remark, that I am aware that it is not new to combine cotton and wool, and also that it is not new to combine wool and silk, when manufacturing yarns. The novelty of my invention consists in employing such fibres in combination only when they are subjected to the process of combing either before or after mixing.

From the above description it will be seen that the object of the invention is to obtain mixed fibres of the kinds above mentioned, with a view to make yarns and weave fabrics thereof; such mixed fibres being placed longitudinally side by side by the act of combing, whether such combing is performed after or before mixing, and they will be suitable for spinning into yarns in like manner to what combed wool is now spun; and such yarn may then be woven into fabrics either alone (both in respect to warp and weft) or with other yarn in the warp or weft. By which means peculiar fabrics may be produced, partaking more or less of the particular fibre which is most or least largely used in the

yarn, and the one or other fibre may be used in quantity in each case, according as it is desired that the yarn should partake more or less of the character of the one or other fibre.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details, so long as the peculiar character of my invention be retained.

But what I claim is, the preparing cotton and wool, also wool and silk, by combining them before or after combing them; and causing such fibres so combined to be spun and woven into fabrics.—In witness, &c.

William Ackroyd.

Enrolled January 31, 1853.

Specification of the Patent granted to Alexander Parkes, *of Pembry, in the County of Carmarthen, Chemist, for Improvements in Obtaining and Separating Certain Metals.* —Sealed May 1, 1852.

To all to whom these presents shall come, &c., &c.—My invention relates, first, to the separation of gold from lead or alloys of lead, by means of zinc; and in order to carry out this part of my invention, I first fuse the quartz ore or other combinations containing gold, with suitable fluxing substances, together with lead or compounds of lead, and whether calcined or not, as is well understood by metallurgists; the lead or compounds of lead serving in this operation as a bath to collect the gold.

Having obtained the gold in alloy with lead or its compounds, I proceed to separate the gold from the lead alloy by means of zinc; and for this purpose I add to every ton of lead, first raised to a melted state and containing ten ounces of gold to the ton, one per cent. of zinc also in a melted state, and in the same proportion for every additional ten ounces of gold, as for example:—

To each ton of lead containing 10 ounces of gold, I add 22 lbs., 4 ounces of zinc.

To each ton of lead containing 20 ounces of gold, I add 44 lbs., 8 ounces of zinc.

To each ton of lead containing 30 ounces of gold, I add 66 lbs., 12 ounces of zinc.

Before adding the zinc to the lead alloy, I melt the auriferous lead in an iron pot, and when at a heat that will melt small pieces of zinc thrown on the surface as tests of its temperature, I add the required quantity of zinc also in a melted state by pouring it into the lead as quickly as possible, and with perforated skimmers or other means agitate the whole, so as to cause an intimate combination of the gold with the zinc, which will take place in a few minutes after the alloy has been well agitated. I allow the whole to remain at rest for an hour or more, when the zinc having taken the gold from the lead will rise to the surface of the lead; and when set, or nearly so, I skim it off, drawing away as much lead as possible; but if the zinc and gold alloy is found to have united with much of the lead, I prefer, before separating the zinc, to put the alloy in an iron vessel, and by the application of heat to sweat and press out the excess of lead. I then separate the zinc from the gold by placing the alloy, with a small quantity of carbonaceous matter, in a clay or other suitable retort, and by the application of heat distil off the zinc, as is well understood by zinc refiners. I then cupel the auriferous compound in the usual manner, which is well understood.

I do not confine myself to the proportion herein set forth, as more or less zinc will be required, according to the amount of impurity in the gold ore or other compound operated upon; and I have found that this part of my invention can be beneficially employed when operating upon compounds of gold which contain platinum, silver, and other metals, which are extracted from the lead along with the gold by the agency of the zinc; these metals, when so obtained, may be separated from the gold by the usual means—by cupellation or by the use of acids.

The second part of my invention consists in obtaining gold and silver from their ores or other combinations by means of lead, zinc, or other metal or alloy that will fuse at a lower heat than the compound containing the gold or silver.

This part of my invention being similar to the amalgamation process, where mercury is employed for the extraction of gold and silver, the difference being that whereas mercury is naturally liquid at ordinary temperature, and lead and the other metals I employ are not liquid without heat, I employ such a degree of heat that will render them liquid, and capable of combining with the silver or

gold, but always without increasing such heat to a point which would fuse the compounds operated upon.

Having ascertained the proportion of gold or silver in the compound to be operated upon, and placed them in an iron barrel or other convenient vessel, and heated them to the melting point of the lead, zinc, or other metal or alloy to be used, I add to every ton of the compound previously reduced into a state of fine division, and containing from ten to twenty ounces of gold or silver, from ten to twenty per cent. of lead or other metal or alloy, together with about five per cent. of chloride of ammonium, or chloride of zinc; or one per cent. of carbon may be used either with or without the above-named salts; and if the silver in the compound to be heated should be in the state of chloride, I add about one per cent. of scrap iron, in order to assist in the reduction of the chloride. I prefer to use an iron barrel, or such other convenient vessel or furnace as will enable me to keep the mixture in motion for from five to ten hours, by which time I have generally found the gold or silver to have combined with the lead or other metal thus employed in fusion to collect them. I then wash out or otherwise collect the auriferous or argentiferous compounds, and which I afterwards heat by cupellation or other means, to obtain the gold or silver.

In case the compound to be treated for gold or silver contains sulphur, I then prefer to use zinc as the collecting agent, and I prefer to use lead upon compounds free of sulphur.

I do not want to confine myself to the above-named salts, or carbonaceous matter, or to the proportions given, my object being, in the use of such salts or carbon, to prevent oxidation of the lead or other metals, and to assist in fluxing or reducing agents in the combination of the gold or silver with the lead, zinc, or other metals used for the purpose of collecting them. Nor do I confine myself to the exact proportions of the lead or other metals to be employed, as the same may be varied, dependent upon the compounds to be operated upon as may be found necessary in practice.—In witness, &c.

ALEXANDER PARKES.

Enrolled November 1, 1852.

Specification of the Patent granted to FREDERIC DAM, *of Brussels, in the Kingdom of Belgium, Chemist, for Improvements in preventing incrustation in boilers.*—Sealed August 23, 1852.

To all to whom these presents shall come, &c., &c.—My invention consists of employing hydrate of potash, or of soda, as a means of throwing down the impurities in the water which usually produce the effect of incrusting the interior of a boiler, and I prefer that such material should be from time to time introduced into the boiler in quantities proportioned to the quantity of water evaporated by the boiler, in order that the hydrate may at all times be in excess, by which, not only will the incrusting of the boiler be prevented; but in case the boiler has become incrusted by previous use without preventive herein mentioned, such incrustation will be removed. I dissolve the hydrate of potash, or soda, in water, and produce a saturated solution thereof, which I introduce into the boiler from time to time, either by means of a tube having two cocks thereon at a distance from each other, closing the cock nearest the boiler when filling the tube, and closing the outer cock when allowing the liquor to flow into the boiler by opening the cock nearest the boiler, or I introduce such liquor by means of a force pump, or other convenient means. Or in place of applying the liquor to the water when it is in the boiler, the preventive liquor may be introduced into the water before it goes into the boiler, and the water may or may not be allowed to stand any length of time before it is introduced into the boiler after applying the preventive liquor; in all cases, however, the preventive liquor should be in excess of that quantity which (on testing any water which is proposed to be used in a boiler) may appear to be required to precipitate the impurities contained in the water. And in order to ascertain the quantity of the solution to be employed for the water which is to be used in a boiler, I take a measured quantity thereof, and drop in several drops of the solution as long as it appears to produce a cloudy or milky effect; I then filter the water, and again drop in more of the solution, and if no further precipitation takes place, the quantity previously used indi-

cates the quantity which should be introduced into the boiler from time to time in proportion to the number of such measures of water introduced into the boiler. The effect of using such liquor or material in a boiler, is to throw down the impurities; but the same will not adhere to the interior surfaces of the boiler, and therefore, in order to prevent accumulations, the same should be blown out from time to time from the boiler as is well understood, and in addition thereto, it is found that in some cases a scum rises to the surface, and it is desirable occasionally to remove the same by blowing it through a guage cock (at or about the water line of the boiler) large enough for such purpose. Although I have named the use of a saturated solution of hydrate of potash, or soda, I do not confine myself thereto, as the same may be used in a weak state when a proportionably larger measure of liquor is to be introduced into the water.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that what I claim, is the application of hydrate of potash, or of soda for the purposes herein described.—In witness, &c.

FREDERIC DAM.

Enrolled February 6, 1853.

Specification of the Patent granted to FREDERICK OCTAVIUS PALMER, *of Great Sutton-street, in the County of Middlesex, Gentleman, for Certain Improvements in the Manufacture of Candles, and also in the Machinery for the Manufacture of such Matters.*—Sealed November 2, 1849.

To all to whom these presents shall come, &c., &c.—My said invention consists,

First, of improvements in the manufacture of candles by the employment of the descriptions of wicks hereafter explained; and,

Secondly, an improved machine, which I call a double fly, for performing cross gymping on wicks to be used in the manufacture of candles.

And, in further compliance with the said proviso, I, the said F. O. Palmer, do hereby more particularly describe such my invention, and several improvements, and the

manner in which the same are to be performed, by the following statement thereof.

First, I would premise that some descriptions of candles have heretofore been made with one, two, or more wicks introduced or placed within the tallow or material composing such candles, in a helical form, for their better combustion; and such wicks have hitherto been ordinarily composed of a number of straight yarns or threads of cotton bound together into a wick by a thread or yarn. I have discovered that it is desirable to give additional strength to maintain such description of wicks until consumed. Now the first part of my invention consists of improving such descriptions of wicks, by the addition to the ordinary straight yarns or threads of cotton above mentioned, a strand of cord or twisted cotton, or other suitable fibre, harder, firmer, or stiffer in substance, which I insert with such straight threads before they are gymped or bound together, the object and purpose thereof being to give additional strength to the wick, to support the wick from falling, and to incline it the more to retain its form of a helix; and having introduced such strand or cord with the others, I then bind them together with the gymping or binding thread as heretofore, or by the cross gymping or binding hereinafter described; for this purpose I employ a cord consisting of three strands of No. 8 yarns, and twisted hard, say about ten turns to the inch; but I do not confine myself thereto, so long as a harder twisted cord is employed to give strength to the wicks made by binding together yarns or threads, in place of having all the yarns or threads of the same kind.

The second of my inventions consists of the use of spiral wicks, of a more simple character, and better adapted to some classes of candles, such as those made of palm oil, or matters more combustible than tallow, and less expensive; it consists of an ordinary cotton cord, such as has been heretofore used for wicks of candles, which, from its firm twisted nature, I find peculiarly adapted for retaining the form of a helix, in which form I introduce wicks into candles; and this I do in the manner ordinarily resorted to for introducing the bound or gymped wicks in the form of a helix into candles.

My next improvements are in platted wick candles. I would premise that platted wicks in their simple form are, when applied to candles made of tallow, or other materials

melting at low temperature, liable to droop when burning, and they then require additional support; and, although some attempts at improvement of such wicks for such purposes have been made by binding up with such platted wicks a braid or cord of stiffer material for their better support, and also by gymping two platted wicks together with a single thread, yet I find them capable of greater improvement, which I effect as follows:—to render such wicks more combustible, and better able to sustain their position, without the incumbrance of such additional braid, cord, or plait, which I effect by my peculiar method of gymping, and by combining with such platted wicks a thread impregnated with bismuth mixed with oil or fatty matter, as now applied to other candle wicks. This I accomplish either by inserting such metallized thread in the wick with one of the cords in the platting, or else by laying a thread so impregnated with bismuth upon the surface or alongside of the platted wick when made; and in either case binding them by a single gymp in my improved mode of gymping, or by means of my improved cross gymping hereinafter referred to, which I prefer, by reason of the additional strength, firmness, and sustaining power which such cross gymping gives to the wick.

My next improvement is in the making of slack gymp candle wicks, for increasing their means of capillary attraction, which I effect by an improved mode of manufacturing such wicks, whereby I acquire greater equality and uniformity in the wicks, and mainly avoid the inequalities produced in the ordinary mode of gymping by the greater or less strain of the gymping thread upon the wick, occasioned by the greater or less facility with which the thread is unreeled. These improved wicks I make and gymp in the ordinary way; but with the assistance of a wire, which I use in the formation of such wick, to form a foundation on which to gymp the wick and occupy a space in it, which space is to be afterwards vacated; and around this wire or substance which I place within the tube of an ordinary gymping machine, I arrange and distribute the threads or yarns, or I lay a platted wick with the metallized thread beside it, which are intended to be gymped, and I proceed to bind them together by the gymping in the ordinary way, but on this improved principle; and the wick is thus bound on the wire from which it is drawn off, as it is gymped or bound. The wire from which the wick is withdrawn leaves a corre-

sponding space within the wick, which then allows the internal threads or yarns, or the platted wick, as the case may be, to expand and distribute themselves in the vacant space so left by the absence of the wire, which renders the wick thus formed more soft and better capable of capillary attraction, and wicks are thus manufactured with much greater regularity and uniformity. These wicks may, if preferred, be gymped with my improved or cross gymping, hereinafter described, in a similar manner, and they are thereby rendered considerably more firm and capable of retaining their position when burning.

I now proceed to describe my improvements in what I call cross gymping, which I apply to any kind of wick, platted or otherwise made. I should here premise that candle wicks of different descriptions have heretofore been made with thread either partially twisted or laid longitudinally straight, and then bound together by a single thread, which has acquired the name of gymp or gymping; and by this means also threads impregnated with metallic substances have been incorporated with the wicks, for assisting combustion and destroying the wick when coming in contact with the atmosphere at the exterior of the flame; but wicks so formed I have found capable of great improvement by additional gymping laid on or wrought upon wicks in a cross or transverse direction; this cross gymping consists of an exterior binding of the materials composing the wick, with two or more threads crossing each other, thereby better confining the materials of the wick, and giving to the wick increased support and utility. One of the methods by which I can effect this cross gymping is in an ordinary gymping machine, in which, after having gymped the wick in one direction throughout, I reverse the motion and gymp the wick over again the other way, so crossing the gymp threads at each revolution; but I much prefer doing the cross gymping with the improved double fly hereinafter described, which at once finishes the gymping, crossing it at the same time with a more even and uniform pressure and more perfect binding of the materials. This cross gymping I perform in a machine similar to the ordinary gymping machines, but provided with two flies and spindles to carry the bobbins, both revolving in different directions on the fixed tube through which the threads or materials of the wick are passed. One fly is driven by a band, and by means of an intermediate bevil-

tooth wheel, running upon an axis fixed on to the tube between the flies to connect them, drives the other fly in a contrary direction. Each of these flies is provided with an arm to carry the bobbins and direct the gymping thread upon the wick to be gymped. One fly and reel rotates within the circle described by the longer or more extended arm of the other fly and reel, and as the wick is drawn through the tube it is bound round by the rotatory movement of the flies and bobbins, which carry the gymping threads, and which at each revolution makes the gymping threads cross each other back and front upon the wick, and thus is performed the double or cross gymping required.

In describing the machine by which I now effect this operation, I by no means limit myself to the precise details of the machine, nor the particular means described of performing the operation of cross gymping, for it may be performed in other ways; nor do I limit myself to the peculiar means which I have described for making my improved wicks of uniform tightness in gymping, as it may be done by other means.

I claim as my invention,

First, the manufacture of candles with the improved coiled wicks hereinbefore mentioned, and the making of coiled wicks by the application of twisted cotton cord into the form of a helix.

Secondly, the manufacture of candles with the improved platted and gymped wicks, as hereinbefore described, and the application of metallized thread or yarn in platted wicks.

Thirdly, the means of manufacturing slack and uniformly gymped wicks, as hereinbefore mentioned.

Fourthly, the manufacture of the improved cross gymped wicks for candles, hereinbefore described; and,

Lastly, the construction, use, and manufacture of the improved double fly or cross gymping instrument, suitable for manufacturing gymped wicks, as hereinbefore described.

And such my invention is to the best of my knowledge and belief entirely new, and never before used in that part of Her Majesty's United Kingdom of Great Britain and Ireland, called England, the said domain of Wales, and town of Berwick-upon-Tweed, or in the islands of Jersey, Guernsey, Alderney, Sark, and Man, or in any of Her

1000 grms. of phosphorus convert 1720 grms. of oxygen into ozone, and indeed with tolerable rapidity. In order to ozonize this quantity of oxygen by means of electrical discharges, the electricity of a thunder-storm would probably be necessary; for even the most powerful discharges which we are able to pass through oxygen or air artificially, produce comparatively but an extremely small amount of ozone. If, therefore, a disengagement of electricity took place during the contact of phosphorus with oxygen or atmospheric air, and if this electricity was the cause of the formation of the ozone which occurs under these circumstances, we might expect to observe the most violent electrical phenomena, in a flask where large quantities of ozone were produced under the influence of phosphorus. But we are not acquainted with anything of the kind; the production of ozone goes on quietly and noiselessly, and no signs of electrical disturbance can in any way be detected. Consequently, if ozone can be formed from common oxygen without the aid of electricity, it appears to me that the term "*Oxygène électrisé*" is altogether inappropriate, and it might with equal justice be called "*Oxygène phosphorisé.*"

2. It is well known that oxygen possesses in many of its combinations the eminently oxidizing properties of ozone, for which reason it appeared to me desirable to express the particular condition of the oxygen in the nomenclature of these substances. This would, however, be difficult if the name "electrified oxygen" is adopted. If, for example, the peroxide of lead is called ozonized oxide of lead, the peroxide of nitrogen ozonized nitrous acid, these names are convenient, and are in harmony with the formula $PbO+O$, NO^2+2O, which I have proposed for these bodies.

Since the above-mentioned physicists themselves affirm that ozone is merely allotropic oxygen, there cannot be any danger of erroneous impressions being formed as to the nature of the body, from the use of the name hitherto employed, to which I shall therefore adhere until a better one than that proposed by these gentlemen is found. Although the experiments of MM. Becquerel and Fremy have not taught us anything essentially new, still some of their statements have a peculiar interest; for instance, the circumstance that ozone is produced even in a closed glass tube, filled with oxygen, when electrical discharges are allowed to strike upon its exterior. The production of

ozone is here evidently the result of an electrical induction in the oxygen from the exterior and through the glass. A similar induction takes place on a large scale on the occasion of every flash of lightning, a very striking instance of which I had once an opportunity of observing. Some years since, a small chapel on the Rhine-bridge, at Basle, was struck by lightning. All the rooms in my house, which is about a hundred paces distant, were filled with a strong odour of ozone at the moment of discharge, and the same was the case in all the neighbouring houses, so that the inhabitants of each imagined that their own dwelling had been struck by the lightning. It is also deserving of especial notice, that the smell of ozone was perceived in rooms which were closed, as well as in those which were in connexion with the exterior atmosphere. This appeared to me to prove satisfactorily, that the ozone was not carried into these houses by currents of air from the place of the discharge, but was actually produced in them by induction, and I have no reason now to consider that this view was incorrect; indeed, it is precisely the same fact upon a large scale which the French physicists have observed on a small one.

M. De la Rive, in speaking of the investigations of MM. Becquerel and Fremy, puts forward a new hypothesis for the explanation of the alteration effected in oxygen by means of electricity, &c. He is of opinion that in ordinary oxygen the atoms are not separate, but combined in groups forming molecules. Since, in the chemical combination of bodies, the atoms unite in single pairs, the cohesion of the atoms forming a molecule of oxygen would oppose their chemical combination with the atoms of other substances, and thus account for the chemical inactivity which oxygen manifests under ordinary circumstances towards other bodies. He regards phosphorus, electricity, &c., as possessing the power of breaking up the molecules of oxygen into separate atoms, on account of which its chemical activity is increased, and it is rendered capable of oxidizing bodies at the ordinary temperature.

According to this view, ozone must be considered as atomic and oxygen as molecular oxygen. However comprehensible this hypothesis may be, I cannot avoid some hesitation in giving my assent to it.

1. We must, if we adopt it, regard ordinary oxygen as a body which is at the same time both solid and fluid. The

molecules must be regarded as solid, inasmuch as they are supposed to be formed by the strong cohesion of individual atoms. But as ordinary oxygen is gaseous, the hypothesis in question must also assume that each separate molecule acts repulsively upon similar molecules. It might, therefore, reasonably be asked, why do the oxygen molecules repel each other, while the atoms constituting such molecules mutually attract? When 10, 100, 1,000 atoms of oxygen unite together, forming one molecule, why does not each such number of atoms combine to form a larger solid body? Why is oxygen gaseous?

2. Ozone remains unaltered in the cold; by heat it is converted into ordinary oxygen, in which condition it remains after cooling. M. De la Rive must therefore explain this change, by assuming that oxygen, consisting of separate atoms (ozone), again assumes a molecular state when its temperature is raised; in fact, that heat facilitates the cohesion of the oxygen atoms, an action the opposite of that which is generally ascribed to this agent.

3. Ozone possesses smell, while ordinary oxygen does not; the former is a violent poison, the latter an indispensably necessary support of animal existence. That these great differences in the physiological action of oxygen and ozone should be owing merely to a different state of mechanical aggregation of the elementary atoms, appears to me very difficult to imagine.

4. It is known that by chemical union with certain bodies oxygen acquires the same oxidizing properties as it acquires when free under the influence of electricity or contact with phosphorus. For example, when one equivalent of nitric oxide (NO^2) combines with two equivalents of oxygen gas, the latter enter into a condition of chemical activity precisely similar to that which ozone possesses. It would be difficult to explain how passive oxygen had in this case been converted into action, according to the hypothesis of M. De la Rive. Probably we must assume that NO^2 breaks up the molecules of ordinary oxygen gas, entering into combination with it, and converts it into the ozonized or atomic condition.

Some years since, Mr. Hunt put forward an hypothesis as to the nature of ozone, which is precisely the opposite to that of De la Rive; according to it the ordinary oxygen was in an atomic, and ozone in a molecular condition. Hunt brought forward no facts of any kind in support

of his hypothesis, and I remarked at the time that the opposite view might be entertained with equal justice, and I still consider both hypotheses of equal value. So long as we are unacquainted with ozone in a pure state, and especially do not know positively anything of its state of aggregation, specific gravity, &c., it appears advisable to postpone all theorizing on the subject, and especially the advancing of hypotheses which are themselves based only upon hypotheses, such, for example, as that which assumes the existence of atoms. With regard to my own opinions, I do not venture to hazard the most remote conjecture as to the cause of that difference in the properties of ordinary oxygen and ozone, differences which are quite as mysterious as remarkable. I will, however, state that it has never yet entered into my mind to seek this cause in the state of mechanical aggregation of oxygen atoms, a course which is certainly not very probable in my case, as I entertain doubts as to the correctness of the dogmas of our modern atomic doctrines.—*Journ. für prakt. Chem.* 1852.

ON THE QUANTITATIVE DETERMINATION OF OZONE.

BY C. F. SCHÖNBEIN.

Since ozone combines even in the cold with silver, forming peroxide, while ordinary oxygen behaves indifferently towards this metal, I have endeavoured to determine the quantity of ozone in a given volume of air by means of the peroxide of silver formed.

If, for example, 60 litres of artificially ozonized air afforded 100 milligrms. of peroxide, I assumed that it contained 13 milligrms. of ozone, presupposing that ozone was nothing more than allotropic oxygen.

This method, besides its tediousness, is otherwise objectionable, and I endeavoured to discover a more convenient process, in which I believe I have succeeded. Instead of silver I employed a solution of indigo in sulphuric acid; and numerous experiments have convinced me that this reagent admits of accuracy and rapid operation, for the quantity of ozone in several litres of air may be determined by it within a few minutes, even to a small fraction of a milligramme. This method depends upon the property possessed by ozone of decolorizing the indigo solution, a property which ordinary oxygen is altogether

destitute of; and, likewise, upon the fact that the most minute quantity of this solution colours a large volume of water. The strength of the indigo solution, which I find the most convenient, is when 10 grammes of it are decolorized by 1 milligrm. of oxygen.

In preparing this test solution, I take 100 grms. solution of indigo prepared according to Berzelius's directions, add an equal quantity of hydrochloric acid, and heat the whole until it boils. I then add to the hot liquid small portions of a dilute solution of chlorate of potash of known strength (one per cent.) shaking the mixture continually until it has become brownish yellow. If, for example, 100 milligrms. of chlorate have been employed to decolorize the indigo solution, I infer that this effect has been caused by the 39 milligrms. of oxygen contained in that quantity of the salt, and consequently that 1 milligrm. of oxygen is capable of decolorizing 100·39 grms. of the solution of indigo. To render this solution of such a strength that exactly 10 grms. of it are decolorized by 1 milligrm. of ozygen, I mix 100 parts with 290 parts of water and preserve it in stoppered bottles.

In order to determine the quantity of ozone in a flask of air containing, for example, 30 litres, and acted upon to the greatest possible degree by phosphorus, I pour 300 grms. of the test-solution into a glass, and add about one-half to the gas at once. The closed flask is then shaken for some minutes, and a small quantity of the liquid poured out to see if it is decolorized. If so, I dip a small strip of moist iodide of potassium paper into the vessel, and if this is coloured, add more solution of indigo until the decolorization is complete, when the quantity of solution employed gives the amount of ozone in the gas.

When, for example, 250 grms. of the test-solution are decolorized, the weight of ozone causing this effect would be $250 \div 10 = 25$ milligrms., in which amount there is no allowance for the quantity of air displaced by the 250 grms. of solution. If the volume of the tested gas reduced to 32° and 76 centim. bar. amounts to 30 litres, and the weight of ozone in it to 30 milligrm., this air contains $\frac{1}{1298}$ ozone, since under these conditions a litre of air weighs 1298 milligrms, and in this quantity of air there is 1 milligrm. ozone.

My recent experiments have proved that atmospheric air may be ozonized to the extent of $\frac{1}{1300}$ by means of phos-

phorus; and did not ozone act so energetically upon phosphorus, a much higher degree of ozonization might be attained. At this point, however, the production and consumption of this substance appear to be equal, and ignition of the phosphorus takes place in consequence of the rapid oxidation.

I have already often pointed out the great similarity between the effects produced by chlorine and ozone. One instance of this is the fact that like chlorine it combines with phosphorus at ordinary temperatures. There can therefore be no doubt that this body would immediately take fire in pure ozone gas, as in chlorine, even in the cold.

As the above-mentioned test-solution of indigo is very dark blue, it may be very greatly diluted, and still appear deeply coloured. I therefore employ two more dilute solutions of such a strength, that 10 grms. of one is decolorized by 1·10 milligrms., and 10 grms. of the other by 1·100 milligrms. of oxygen. By this means it is evident that even very small fractions of a milligrm. of ozone may be detected and estimated.

With this very delicate reagent I have found that ozone diluted with 500,000 times its volume of atmospheric air may still be recognised by its smell, sufficiently proving that the pure ozone must have a most intense odour.—*Ibid.*

ON THE OCCURRENCE OF GOLD IN PENNSYLVANIA.

BY CHARLES M. WETHERILL, PH.D.

In the spring of 1851, an earth was given to me for examination, of which the locality was not exactly stated, but which was said to have been taken not far from the city, in which gold was detected. The earth was said to have been obtained in digging a well. Several months later, while in Reading, I met with a notice in a German newspaper of that place, which stated that some time previously an earth had been found in digging a well, upon the land of Mr. Yoder, Franconia Township, Montgomery county, which proved, upon examination, to contain gold. I have no doubt but that this is the locality of the earth which I examined. Several rocks from the neighbourhood were analyzed, consisting of clay slate rock, ferruginous quartz,

decayed in places, containing pyrites and magnetic oxide of iron-sand. In most of these gold was detected in traces. Some specimens contained no gold whatever. The earth from the well, which was more particularly examined, consisted of sand and gravel, coating in some places fragments of shale or other rock. A careful examination of these with the lens detected a rather thick spangle of gold adhering to the gravel, and a small rounded mass of a white malleable metal, which proved by a micro-chemical investigation upon half of it to be native tin, which occurs only, according to Dana, in small greyish-white metallic grains along with Siberian gold. It melted before the blowpipe, was oxidized by nitric acid, the resulting oxide being insoluble in tartaric acid, and dissolved slowly in HCl, with which solution HS gave the yellowish-brown precipitate $SnS+SnS^2$. This occurrence of native tin is strongly opposed to the supposition of fraud in the earth examined. Separating the rock and washing, gave a further quantity of very fine gold spangles, mingled with pyrites and magnetic oxide of iron, together with more spangles of native tin. One pound and a half of the original substance, from which these spangles were removed, after separation of the rocks and concentration by washing, was melted with twice its weight of litharge (previously tested for gold), and a small quantity of charcoal powder. The resulting button of lead was cupelled (adding to the lead the gold already found) and the silver treated with nitric acid, which left a coherent mass of gold weighing 0·006 grm. One hundred pounds of the earth would, therefore, contain 0·4 grm. of gold, worth about twenty-six and a half cents.

During a stay at Reading, in the summer of 1851, I noticed a vein of decayed ferruginous quartz, very much resembling the auriferous quartz of North Carolina. It was uncovered in exploring the deposits of iron ore in Penn's Mount behind the city. I neglected at the time to secure specimens; and upon a second visit to the locality this spring, to obtain a quantity for analysis, I found it covered. I obtained, however, from the vicinity a quartz rock, quartz and felspar mingled, and sand, which on analysis yielded an exceedingly minute quantity of a brownish powder, after treating the silver button resulting from cupellation by nitric acid; but which was too minute from which to derive any definite conclusion as to the presence or absence of gold. A former pupil of mine, in an examina-

tion of the pyrites of the same locality, thought to have detected traces of gold. I have no doubt that a more careful examination of the rocks in the vicinity would yield affirmative results in an examination for this metal.—*From the Transactions of the American Philosophical Society.*

INSTITUTION OF CIVIL ENGINEERS.

February 15, 1853.

JAMES MEADOWS RENDEL, ESQ., PRESIDENT, IN THE CHAIR.

The Paper read was "On the use of Heated Air as a Motive Power," by Mr. Benjamin Cheverton.

The author, in a short historical notice, stated that Sir George Cayley had written on the subject in 1804 and 1807, and had subsequently built several engines, but that the Messrs. Stirling, of Scotland, produced the first really efficient engine, working by means of heated air, in the year 1827; in the same year Messrs. Parkinson and Crosley brought forward their air engine; that Mr. Ericsson, following more closely the arrangements and form of the ordinary steam-engine, constructed an air, or a "Caloric Engine," as it was termed, in 1833;—Messrs. Stirling patented further improvements in 1840, and in 1845 their engine was described to and discussed at the Institution of Civil Engineers;—in 1851 Mr. Ericsson brought forward his present form of engine;—and that the principle acted upon in both these latter inventions, and announced as an important discovery in motive mechanics, was the reiterated use of the same caloric, in the production of power. The mechanical means of realizing this idea were described, and it appeared that in both inventions they were substantially identical. The ejected hot air, by being brought into contact with an extensive metallic surface of wire gauze, was deprived of its heat, which the next moment was imparted to the incoming cold air, and thus the ultimate use of the furnace was only to supply the unavoidable waste of caloric by radiation.

This view of the subject was strongly contested, as being inconsistent with the best-established laws of nature, and as involving the idea of the possibility of the creation

of power. It was argued at some length, that the employment of caloric as a motive agent, consisted in the development from molecular forces, of a dynamic force, and as such, was directly amenable to the third law of motion—that of action and reaction being equal and opposite. It was contended, that sensible caloric was not an indication of the presence, but of the abeyance of mechanical action; that these were interchangeably convertible quantities; and consequently, that a working force could appear, only as heat disappeared—a conclusion entirely opposed to the assumed principle of the "caloric engine," that "caloric could be made to operate over and over again." It was admitted, however, that there was an apparent anomaly in the application of the law of action and reaction, when caloric was in question, in the fact, that its quantity was not less after than before the generation of steam power, if it were estimated conjointly by water and temperature. But it was explained, that a cause might have two classes of effects, and might require two distinct and different measures, to indicate its entire efficiency; that while caloric might remain intact, under the aspect adverted to, it lost by a declination in the intensity of its temperature, for which the equivalent gain was a dynamic force—a conclusion as adverse as before to the idea that such force could be acquired without cost. It was, in short, in the aspect of a *vis viva* "force" in caloric, that the development of mechanical action must be considered. These views were further explained and illustrated, by a reference to the analogous difference between momentum and the more practical modification of power, named by Smeaton and Watt, "mechanical power," "work," and "duty;" and it was shewn, that here also an apparent discrepancy existed in relation to the third law of motion, but which was cleared up when both the measures of power—that by time and that by space—were appropriately used.

It was contended that the "caloric engine" was analogous to a non-expansive high-pressure steam-engine, which it would exceed in wastefulness of heat, if it were not provided with, what its inventor improperly termed, a "regenerator;" the office of which, it was insisted, was simply to absorb the unutilized sensible caloric of the escaping air, which, as compared with steam, was in very large proportion to the efficient caloric; and to afford another opportunity for its being converted into force, thus compensating for the

loss of expansive pressure. An explanation, founded on these considerations, was given of the continued action of the engine, for some time after the fire was withdrawn—a fact which had been advanced in support of, what was styled, the untenable hypothesis of a "regenerator of force."

Although the mechanical effect of heat might be proved to be independent of the chemical condition, if not also of the physical constitution of bodies, it was admitted that economy of fuel, as being a distinct question from that of economising the caloric already in possession, was eminently a practical matter, only to be determined by experiment; and in this point of view it was explained, in what manner the reception of heat, at a much higher temperature than steam, was greatly in favour of air as a motive agent, but, on the other hand, many adverse considerations were adduced, tending to show the impracticability of the system in its present form.

In conclusion, it was shown, that the "Caloric Engine" did not rest on true principles, exclusively its own,—that its merits stood upon common ground with those of the steam-engine; and, therefore, that, even should the performances of air be found superior to those of steam, it could not be anticipated that the former would immediately supersede the latter; but, as far as public statements could be relied on, the performances of the air-engine on board the "caloric ship," Ericsson, were very unfavourable to the pretensions of the promulgators of the plan.

The discussion was commenced by an exposition of the several systems adopted by Sir G. Cayley, Stirling, Parkinson, and Crosley and Ericsson, illustrating them by diagrams; whence it appeared, that the most preferable mode of heating the air was that of Sir G. Cayley, by directly traversing the incandescent fuel; that the great improvement recently introduced by Ericsson was the wire gauge regenerator, which, however, formed an integral part of Stirling's original design. The practical difficulties of the immense dimensions of the heating vessels and cylinders, and the rapid destruction of the metallic parts, were fully considered; and it was admitted that although, at present, there did not appear to be any positive recorded results, more advantageous than by the use of steam, it would be wrong to discourage the attempt to use heated air, and to overcome the inherent difficulties of the system.

Allusion was made to the appendix to a tract, published by Mr. A. Gordon, wherein it was shown that the volume of the gases into which one cubic foot of anthracite coal was decomposed, under atmospheric pressure, was 219,250 cubic feet; that the volume of air required to sustain combustion was 14,273 feet; the mechanical power developed was 473,000,000 lbs., raised one foot. It was proposed by Mr. Maxwell Lefroy to pass these gases through water, in order to purify them from grit, &c., and to cool them to a convenient temperature, and then to use them together with steam, in power cylinders. He proposed a system of co-axial cylinders, of which the central one was the furnace, the two next were cylindrical shell boilers, the water in the inner one of which completely covered the surface of the furnace, that in the outer one having its surface always below the insertion of the gas-pipes in the furnace; the exterior shells being for the purpose of gradually heating the air, in its passage to the furnace, so that the exterior shell, which alone sustained the bursting pressure, was always cool.

About one-seventeenth part of the power produced would be expended in forcing in the air required to sustain the combustion of the fuel. The coal-hopper was co-axial with the furnace, and was kept cool by the supply water descending through its hollow shell into the interior.

The system would be one of high pressure, and some of its advantages were assumed to be the absence of a funnel, saving three-fourths of the fuel, safety from explosion, with economy of first cost, space, and labour.

The discussion of the paper was adjourned until the Meeting of Tuesday, February 22, when it was announced that the whole of the evening would be devoted to the subject.

February 22, 1853.

J. M. RENDEL, ESQ., PRESIDENT, IN THE CHAIR.

The evening was entirely devoted to the renewed discussion of Mr. B. Cheverton's Paper, "On the use of Heated Air as a motive power."

The construction of Ericsson's engine, and the appli-

cation of the regenerator were first described, and it was then argued, that the action of the regenerator almost amounted, theoretically, to the creation of force, and that it was not of the utility that had been presumed. From the best accounts, it appeared that various practical difficulties existed, in the application of heated air as a motive power, and from calculations which were entered into, it was shown, that the mean pressure of the air in the working cylinder being $4\frac{1}{2}$ lbs., the engines making eleven strokes per minute, a total power was developed, which, after making a proper deduction for friction and waste, did not exceed 280 horse power with the cumbrous machinery which was described; it was then contended, that with such a fine model of a ship, and under the circumstances of the experiments, a greater speed than seven miles an hour ought to have been attained, with a less expenditure of fuel, and that, therefore, at present, the caloric engine could not be practically regarded as a successful innovation.

Tables and diagrams were exhibited, for the purpose of showing the relative amount of power obtainable from a given quantity of heat, applied in expanding air and in producing steam. From these it appeared that after taking into account all the conditions of each case, the useful effect would be nearly the same, independent of the regenerator, which, if not a fallacy, would turn the scale in favour of the use of heated air.

It was submitted by other speakers, that the machine involved a mechanical fallacy, as the regenerator produced no mechanical effect whatever. It might be granted, that the regenerator of Ericsson's engine received and re-delivered the heat, in the manner described, and that when the working piston was descending, the heat was deposited, and that when ascending the heat was restored; but that operation could only result as a *consequence* of the motion of the piston, and not as a *cause* of its motion—hence no mechanical effort was made. This result was easily shown, by assuming the contents of the pump to be one, and the contents of the working cylinder to be two. If the working piston was at the bottom of the cylinder, and in equilibrium with the external atmosphere, as regarded the pressure on a unit of surface, and then began to move and the air to be heated, in its passage through the regenerator from thirty-two degrees to a temperature of 512 degrees,

so as to double its volume, the lower piston would constantly produce a vacuity, so to speak of two, to be constantly fed by a supply of one, from the pump, expanded into two, by the increase of temperature. Consequently the piston, at every instant of its motion, remained in equilibrium with the external atmosphere, and no mechanical effect could result. Still in Ericsson's engine a mechanical effect had been produced; but then this mechanical effect was no greater than would be produced without the aid of the regenerator, by the simple action of the furnace itself, and not so economically as by the use of steam.

Further investigations were entered into of the theory of the air engine, and the general result appeared to exhibit so much distrust of the accounts already received of the working of the caloric ship, that it was suggested, that the further discussion of the subject should be adjourned for a few weeks, and meanwhile another paper was proposed to be written, so that the question could be more fully discussed on the next occasion.

LIST OF IRISH PATENTS.

From September 4, *to October* 22, 1852.

Henry Bessemer, of Baxter House, Old St. Pancras-road, for Improvements in expressing saccharine fluids, and in the manufacture of refining and treating sugar.—Sealed September 4, 1852.

Frederick Sang, of No. 58, Pall-mall, in the county of Middlesex, Artist in Fresco, for Improvements in floating and moving vessels, vehicles, and other bodies in and over water.—Sealed September 28, 1852.

Charles James Pownall, of Addison-road, in the county of Middlesex, Gentleman, for Improvements in the treatment and preparation of flax and other vegetable fibrous substances.—Sealed October 22, 1852.

Alexander Mills Dix, of Salford, in the county of Lancaster, Brewer, for Certain improvements in artificial illumination and in the apparatus connected therewith, which improvements are also applicable to heating and other similar purposes.—Sealed October 22, 1852.

Thomas Wilks Lord, of Leeds, in the county of York, Flax and Tow Machine-maker, for Improvements in machinery for spinning, pressing, and heckling flax, tow, hemp, cotton, and other fibrous substances.—Sealed October 22, 1852.

LIST OF SCOTCH PATENTS,

Completed under the Old Law, after the 1st of October, 1852.

ROBERT BURN, of Edinburgh, Scotland, Practical Engineer, for Improvements in steam-engines.—Sealed October 6, 1852.

THOMAS ELLWOOD HORTON, of Prior's Lee Hall, in the county of Salop, Iron Master, for Improvements in apparatus for heating and evaporating.—Sealed October 12, 1852.

ROBERT M'GAVIN, of Glasgow, in the county of Lanark, North Britain, for Improvements in the manufacture of iron for ship-building.—Sealed October 21, 1852.

WILLIAM CHARLES SCOTT, of No. 7, Waltham Cottages, Warner-road, Camberwell, in the county of Surrey, Gentleman, for Improvements in the construction of omnibuses, also in other public and private vehicles.—Sealed October 25, 1852.

RICHARD CARDWELL M'BRIDE, of Alestragh, in the county of Armagh, for Certain improvements in machinery for scutching or otherwise preparing flax and other like fibrous materials.—Sealed November 29, 1852.

RICHARD CHRISTOPHER MANSELL, of Ashford, in the county of Kent, Civil Engineer, for Improvements in the construction of railways, in railway rolling stock, and in the machinery for manufacturing the same.—Sealed December 17, 1852.

Sealed from November 5, 1852, to January 31, 1853, under the 53d Section of the Patent Law Amendment Act, 1852.

JAMES STEVENS, of Birmingham, in the county of Warwick, Glass Manufacturer, for Certain improvements in lamp glasses.—Sealed November 5, 1852.

RICHARD ARCHIBALD BROOMAN, of the firm of J. C. Robertson and Co., of No. 166, Fleet-street, for Improvements in knitting machinery.—Sealed November 12, 1852.—(Communication.)

RICHARD ROBERTS, of Manchester, in the county of Lancaster, Engineer, for Certain improvements in and applicable to boats, ships, and vessels.—Sealed November 12, 1852.

JOHN MASON, of Rochdale, in the county of Lancaster, and GEORGE COLLIER, of Halifax, in the county of York, Manager, for Certain improvements in preparing, spinning, twisting, doubling, and weaving cotton, wool, and other fibrous materials, also in tools or apparatus for constructing parts of machines used in such manufactures.—Sealed November 16, 1852.

WILLIAM COOK, of the Town or Borough of Kingston-upon-Hull, Working Copper Smith, for Certain improvements in the construction of steam-engines, consisting of a rotatory circular valve for the regular admission of steam from the boiler alternately into the chambers of the two cylinders of double-acting engines.—Sealed November 17, 1852.

WILLIAM EDWARD NEWTON, of 66, Chancery-lane, London, Civil Engineer, for Improvements in the construction of fences.—Sealed November 17, 1852.—(Communication.)

William Rettie, of Aberdeen, Lamp Manufacturer, for Certain improvements in lamps and burners, in apparatus for ventilating apartments, and in the mode of working signal lamps.—Sealed November 17, 1852.

George Pearson Renshaw, of the Park, Nottingham, Civil Engineer, for Improvements in cutting and shaping.—Sealed November 18, 1852.

William Church, Civil Engineer, and Samuel Aspinwall Goddard, Merchant and Manufacturer, for Improvements in fire-arms and ordnance, and in projectiles, to be used with such or the like weapons, and also improvements in machinery or apparatus for the manufacture of part or parts of such fire-arms, ordnance, and projectiles.—Sealed November 22, 1852.

John Knowles, of Bolton-le-Moors, in the county of Lancaster, for Improvements in certain machinery for preparing cotton and other fibrous materials for reversing the direction of motion in and for regulating the speed of machines.—Sealed November 23, 1852.

William Edward Newton, of the Office for Patents, No. 66, Chancery-lane, London, Civil Engineer, for Improvements in machinery or apparatus for sewing.—Sealed November 24, 1852.—(Communication.)

Charles James Wallis, of Clarendon Chambers, Hand-court, Holborn, in the county of Middlesex, Civil Engineer, for Improvements in machinery for crushing, pulverizing, and grinding stone, quartz, and other substances.—Sealed December 22, 1852.

Edwin Pettett, of Kingsland, in the county of Middlesex, Civil Engineer, for Improvements in machinery for twisting, drawing, doubling, and spinning of cotton, wool, silk, flax, and other fibrous substances.—Sealed December 22, 1852.

Patrick M'Anaspie, of Liverpool, Gentleman, for A new manufacture of Portland stone, cement, and other compositions, for general building purposes and hydraulic works.—Sealed December 22, 1852.

Henry Bridson, of Bolton, in the County of Lancaster, Bleacher, for Improvements in machinery for stretching, drying, and finishing woven fabrics.—Sealed December 22, 1852.

James Norton, of Ludgate-hill, in the City of London, Merchant, for Improvements in apparatus for ascertaining and registering the mileage run by public vehicles, during a given period, also the number of persons who have entered in or upon, or are travelling in public vehicles, part of which improvements is applicable to public buildings, and other places where tolls are taken.—Sealed December 22, 1852.

James Higgins, of Salford, Machine-maker, and Thomas Scholefield Whitworth, of same place, Mechanic, for Certain improvements in machinery or apparatus for spinning and doubling cotton and other fibrous substances.—Sealed December 23, 1852.

Alfred Vincent Newton, of 66, Chancery-lane, London, Mechanical Draughtsman, for improvements in the mode of priming fire-arms.—Sealed December 23, 1852.—(Communication.)

William Edward Newton, of 66, Chancery-lane, London, Civil Engineer, for Improvements in machinery or apparatus for cutting paper, pasteboard, or other similar substances.—Sealed December 23, 1852.—(Communication.)

John Charles Wilson, of Redford Flax Factory, Kircaldy, Scotland, for Improvements in the machinery and processes in and for the

manufacture of flax, and other fibrous vegetable substances.—Sealed December 23, 1852.

SAMUEL MORRIS, of Stockport, Boiler Maker, for Certain improvements in steam boilers.—Sealed December 24, 1852.

PETER ARMAND LE COMTE DE FONTAINEMOREAU, of 4, South-street, Finsbury, London, for Improvements in producing gas and in its application to heat and light.—Sealed December 24, 1852.—(Communication.)

JAMES FLETCHER, of Leyland, near Bristow, county of Lancaster, Bleacher, for Improvements in machinery or apparatus for stretching and drying woven fabrics.—Sealed December 24, 1852.

CLAUDE ARNOUX, of Paris, for Certain improvements in the construction of railway carriages.—Sealed December 24, 1852.

ANDREW CROSSE, of Broomfield, county of Somerset, for Improvements in the extraction of metals from their ores.—Sealed December 27, 1852.

ROBERT REYBURN, of Greenock, Scotland, Chemist, for Improvements in printing on silk and other fabrics and yarns.—Sealed December 27, 1852.

MOSES POOLE, of Serle-street, London, for Improvements in combining caoutchouc with other materials.—Sealed December 28, 1852. —(Communication.)

MOSES POOLE, of Serle-street, London, for Improvements in the manufacture of combs.—Sealed December 28, 1852.—(Communication.)

JAMES JOHNSON, of Waterloo-place, Haggerston-bridge, Kingsland, London, Hat Manufacturer, for Certain improvements in the manufacture of hats.—Sealed December 28, 1852.

SAMUEL FOX, of Stocks-bridge Works, Deepear, near Sheffield, for Improvements in umbrellas and parasols.—Sealed December 28, 1852.

HENRY MEDHURST, of Clerkenwell, London, Engineer, for Improvements in water meters, and in regulating, indicating, and ascertaining the supply of water and liquids.—Sealed December 29, 1852.

WILLIAM BURGESS, of Newgate-street, London, Gutta Percha Merchant, for Improvements in the manufacture of gutta percha tubing. —Sealed December 29, 1852.

ROBERT GRIFFITHS, of Clifton, Engineer, for Apparatus for improving and restoring human hair.—Sealed December 29, 1852.

GEORGE ROBINS BOOTH, of Wandsworth-road, Surrey, for Improvements in the manufacture of gas.—Sealed December 29, 1852.

SARAH LESTER, of St. Peter's-square, Hammersmith, London, for Improvements in treating the seeds of flax and hemp, and also in the treatment and preparation of flax and hemp for dressing.—Sealed December 29, 1852.

WILLIAM SMITH, of Little Noolstone, county of Bucks, for Improvements in machinery for reaping.—Sealed December 30, 1852.

FREDERICK DAM, of Brussels, Belgium, Chemist, for Improvements in preventing incrustation in boilers.—Sealed December 30, 1852.

WILLIAM SEPTIMUS LOSH, of Wreay Sykes, near Carlisle, for Improvements in the purification of coal gas.—Sealed December 30, 1852.

George Frederick Parratt, of Piccadilly, London, for Improvements in life rafts.—Sealed December 30, 1852.

Alexander Parkes, of Pembry, county of Carmarthen, for Improvements in obtaining and separating certain metals.—Sealed December 31, 1852.

John Moore, of Arthur's Town, county of Wexford, Ireland, for Improvements in nautical instruments, applicable for ascertaining and indicating the true spherical curve and distance between port and port. —Sealed December 31, 1852.

Joseph Leese, junr., of Manchester, Calico Printer, for An improved system of preparing, cutting, and engraving rollers to be used for printing woven and other fabrics, and improved machinery for printing and washing the same fabrics.—Sealed December 31, 1852.

John Jeffray Dixon, of the Royal Slate Quarries, Bangor, and Arthur Dodson, of Bangor, for Improvements in machinery and apparatus used in quarrying slate and stone, and in cutting, dressing, planing, framing, and otherwise working and treating slate and stone; and in apparatus and wagons used for moving and conveying slate and stone, and improvements in joining, forming and connecting slate and stone.—Sealed December 31, 1852.

Henry Stothert, of Bath, Engineer, for improvements in the manufacture of manure.—Sealed December 31, 1852.—(Communication.)

Charles Thomas, of Bristol, Soap Manufacturer, for Improvements in the manufacture of soap.—Sealed January 3, 1853.

Hugh Lee Pattinson, of Scots' House, near Newcastle-upon-Tyne, Manufacturing Chemist, for Improvements in smelting certain substances containing lead.—Sealed January 3, 1853.

George Hutchison, of Glasgow, Scotland, for A method of preparing oils for lubricating and burning.—Sealed January 3, 1853.

Solomon Andrews, of Perth, Amboy, United States, Engineer, for Improvements in machinery for cutting, punching, stamping, forging, and heating metal, and other substances, which are also applicable to the driving of piles, and other similar purposes, and to crushing and pulverizing ores and other hard substances.—Sealed January 4, 1853.

John Trotman, of Dursley, Gloucestershire, for Improvements in anchors.—Sealed January 4, 1853.

Samuel Cunliffe Lister, of Manningham, near Bradford, for Improvements in treating and preparing, before being spun, wool, cotton, and other fibrous materials.—Sealed January 5, 1853.

Thomas Allen, of Edinburgh, Engineer, for Improvements in producing and applying electricity, and in apparatus employed therein. —Sealed January 5, 1853.

William Hetherington, of Handsworth, near Birmingham, for Improved machinery for stamping and shaping metals. — Sealed January 6, 1853.—(Communication.)

John Ramsden, of Manchester, Screw-bolt Manufacturer, for Certain improvements in machinery or apparatus for cutting screws.— Sealed January 7, 1853.

Thomas Willis, of Manchester, Machine-maker, for Certain improvements in machinery or apparatus for winding yarns or threads, and also improvements in looms for weaving.—Sealed January 7, 1853.

Julian Bernard, of Guildford-street, Russell-square, London, for Improvements in the manufacture or production of boots and shoes,

and in materials, machinery, and apparatus connected therewith.—Sealed January 10, 1853.

MARTIN JOHN ROBERTS, of Wood Bank, county of Bucks, for Improvements in the production of electric currents, in obtaining light, motion, and chemical products and effects by the agency of electricity; part or parts of which improvements are also applicable to the manufacture of acids, and to the reduction of ores.—Sealed January 11, 1853.

JOHN KIRKHAM, of the New-road, Sunderland, Engineer, and THOMAS KIRKHAM, of Fulham, Civil Engineer, for Improvements in the manufacture of gas for lighting and heating.—Sealed January 11, 1853.

WILLIAM HUNT, of Stoke Prior, in the county of Worcester, Manufacturing Chemist, for Certain improved modes or means of producing or obtaining ammoniacal salts.—Sealed January 12, 1853.

THE EARL OF DUNDONALD, Admiral in Her Majesty's Navy, for Improvements in the construction and manufacture of sewers, drains, pipes, reservoirs, and receptacles for liquids or solids; and for making columns, pillars, capitals, pedestals, vases, and other useful and ornamental objects from a substance never before employed for such manufactures.—Sealed January 12, 1853.

CHARLES BUTLER CLOUGH, of Tyddyn Wold, in the county of Flint, for Certain improvements in machinery or apparatus applicable to the purposes of brushing and cleaning.—Sealed January 14, 1853.

ROGER HIND, of Winington, Engineer, for Certain improvements in the construction of machinery or apparatus applicable to weighing machines, weigh bridges, railway turn tables, cranes, and other similar apparatus.—Sealed January 14, 1853.

JOHN RIDGWAY, of Cauldon-place, Staffordshire, China Manufacturer, for Certain improvements in the method and processes of ornamenting or decorating articles of glass, china, earthenware, and other ceramic manufactures.—Sealed January 14, 1853.

CHARLES GREEN, of Birmingham, in the county of Warwick, for Improvements in the manufacture of brass tubes.—Sealed January 14, 1853.

JOHN LAWSON and EDWARD LAWSON, of Leeds, Machine-makers, for Improvements in machinery for scutching and cleaning flax straw.—Sealed January 14, 1853.

WILLIAM EDWARD NEWTON, of Chancery-lane, London, Civil Engineer, for Improvements in steam and other guages.—Sealed January 17, 1853.—(Communication.)

CHARLES PAYNE, of the Wandsworth-road, Surrey, for Improvements in drying animal and vegetable substances.—Sealed January 17, 1853.

DAVID NAPIER, of Millwall, London, for Improvements in steam-engines.—Sealed January 17, 1853.

WILLIAM WOOD, of Monkhill House, near Pontefract, Yorkshire, for Improvements in the manufacture of carpets and other fabrics.—Sealed January 17, 1853.

WILLIAM HODGSON, of Shircoat, in the county of York, Engineer, for Improvements in the manufacture of woven, textile, and looped fabrics, and in the machinery employed therein.—Sealed January 18, 1853.

THOMAS MARSDEN, of Salford, Machine-maker, for Improvements in machinery for heckling and combing flax and other fibrous materials.—Sealed January 18, 1853.

CHRISTOPHER RAND, of Shad Thames, Surrey, for Improvements in grinding wheat and other grain.—Sealed January 19, 1853.

WILLIAM WOOD, of Pontefract, Yorkshire, for Improvements in the manufacture of carpets and other fabrics, and in apparatus or machinery connected therewith.—Sealed January 19, 1853.

RICHARD EDWARD HODGES, of Bycroft, Herefordshire, for Improvements in mechanical purchases, which are also applicable in whole or in part to projectiles.—Sealed January 19, 1853.

FREDERICK BENJAMIN GEITHNER, of Camden-street, Birmingham, for Improvements in the manufacture of castors and legs of furniture. —Sealed January 19, 1853.

WILLIAM ARMAND GILBEE, of 4, South-street, Finsbury, London, for Certain improvements in machinery for cutting corks.—Sealed January 20, 1853.—(Communication.)

ALFRED RICHARD CORPE, of 15, King-street, St. James's, London, for Improvements in trowser-strap fasteners. — Sealed January 20, 1853.

STEPHEN REED, of Newcastle-upon-Tyne, for Certain improvements in railway rails and chairs.—Sealed January 20, 1853.

CHARLES HARRATT, of Royal Exchange-buildings, London, for Improvements in rolling iron.—Sealed January 20, 1853.

RICHARD DOVER, of New-street, Spring-gardens, London, for Improvements in treating sewerage, in obtaining products therefrom, and combining such products with other matters. — Sealed January 20, 1853.

ROBERT BEART, of Godmanchester, for Improvements in the manufacture of bricks and tiles.—Sealed January 21, 1853.

HECTOR LEDRU, of Paris, France, for Improvements in heating.—Sealed January 21, 1853.

HENRY ADCOCK, of Northumberland-street, Strand, London, for Improvements in the manufacture of pipes, chimney-pots, and hollow vessels, also bricks, tiles, copings, columns, and other articles used in building houses and other structures.—Sealed January 21, 1853.

JAMES TIMMINS CHANCE, of Birmingham, for Improvements in the manufacture of glass.—Sealed January 24, 1853.

JAMES TIMMINS CHANCE, of Birmingham, for Improvements in the manufacture of glass.—Sealed January 24, 1853.

JULIUS ROBERTS, of Portsmouth, Lieutenant in the Royal Marine Artillery, for Improvements in the Mariner's Compass.—Sealed January 24, 1853.

DOUGLAS HEBSON, of Dale-street, Liverpool, for Improvements in steam-engines.—Sealed January 24, 1853.

MARIA AMADEE CHARLES MELLIER, and JEAN THEODORE COUPIER, of 16, Castle-street, Holborn, London, for Improvements in the manufacture of paper.—Sealed January 24, 1853.

WALTER RICARDO, of the firm of A. and W. Ricardo, of the City of London, Sharebrokers, for Improvements in gas-burners.—Sealed January 25, 1853.

HENRY HOULDSWORTH and JAMES HOULDSWORTH, of Manchester, in the county of Lancaster, for Certain improvements in the fixing, extending, and holding of cloth to receive embroidery, and in apparatus applicable thereto.—Sealed January 31, 1853.

HENRY HOULDSWORTH, of Manchester, in the county of Lancaster, Cotton Spinner, for Improvements in embroidering machines, and in apparatus used in connexion therewith.—Sealed January 31, 1853.

LIST OF ENGLISH PATENTS.

Sealed under the Old Law.

Pierre Isidor David, of Paris, in the Empire of France, Machinist, for Certain improvements in the method of bleaching, and in the apparatus connected therewith.—Sealed February 5, 1853.

Mary Honiball, of Saint John's Wood, in the county of Middlesex, Executrix of the will of James Honiball, deceased, of An extension for the term of six years from the 15th of August, 1852, of letters patent granted to William Henry Porter, of Russia-row, Milk-street, in the city of London, Warehouseman, for Improvements in anchors, and which said letters patent were assigned by the said William Henry Porter to the said James Honiball.—Sealed February 9, 1853.

PATENTS SEALED UNDER PATENT LAW AMENDMENT ACT, 1852.

To February 23, 1853.

5. Joshua Smith, of Sheffield, in the county of York, carrying on business along with my partner in trade, William Thorne, under the firm of Thomas Turner and Company, Merchants and Manufacturers, for Improvements in table-knives.—Dated October 1, 1852. Sealed January 8, 1853.

6. Moses Poole, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in the manufacture of guns and pistols.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

14. Thomas Christy, junior, of Gracechurch-street, in the City of London, for Improvements in weaving hat-plush and other piled fabrics.—Dated October 1, 1852. Sealed January 8, 1853.

16. Moses Poole, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in the manufacture of telescope and other tubes.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

19. Moses Poole, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in moulding articles, when india-rubber, combined with other materials, are employed.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

21. George Duncan and Arthur Hutton, of Chelsea, in the county of Middlesex, for Improvements in the manufacture of casks.—Dated October 1, 1852. Sealed January 8, 1853.

24. Moses Poole, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in the making covers for and in binding books and portfolios, and in making frames for pictures and glasses.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

28. Moses Poole, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in coating metal and other substances with a material not hitherto used for such purposes.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

29. JOHN DANIEL EBINGRE, of Brussels, for Improvements in the manufacture of animal charcoal.—Dated October 1, 1852. Sealed January 8, 1853.

30. MOSES POOLE, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in the manufacture of trunks, cartouch, and other boxes, knapsacks, pistol-holsters, dressing, writing, and other cases, and sword and other sheaths.—Dated October 1, 1852. Sealed January 8, 1853.—(Communication.)

15. JOSEPH BARKER, of Kennington-lane, in the county of Surrey, for Improvements in fastenings.—Dated October 1, 1852. Sealed January 12, 1853.

22. HENRY WALKER WOOD, of Briton Ferry, near Neath, in the county of Glamorgan, for Improvements in the constructing of ships and other vessels.—Dated October 1, 1852. Sealed January 12, 1853.

36. JAMES HARE, of Birmingham, in the county of Warwick, for Improvements in expanding tables and in music stools.—Dated October 1, 1852. Sealed January 13, 1853.

17. CHARLES HENRY NEWTON, of No. 192, Camden-road Villas, in the county of Middlesex, and GEORGE LEEDHAM FULLER, of Peckham, in the county of Surrey, for Improvements in protecting electric telegraph wires.—Dated October 1, 1852. Sealed January 21, 1853.

384. JOSEPH HENRY TUCK, of Pall-mall, in the county of Middlesex, Engineer, for Improvements in stuffing boxes, and in packing to be used in stuffing boxes, bearings, and pistons.—Dated October 14, 1852. Sealed January 27, 1853.

456. ANTHONY LIDDELL, of Canterbury, in the county of Kent, Engineer, for Improvements in stuffing boxes, and in packing to be employed with stuffing boxes and pistons.—Dated October 20, 1852. Sealed January 27, 1853.

716. RICHARD BARNES, of Wigan, in the county of Lancaster, Ironmonger and Brass Founder, for Improvements in cocks or plugs for water or other fluid.—Dated November 11, 1852. Sealed January 27, 1853.—(Complete Specification, filed.)

758. WILLIAM EDWARD NEWTON, of 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in knitting machinery.—Dated November 15, 1852. Sealed January 27, 1853.—(Communication.)

62. JOHN SAYERS, of 6, Prospect-place, Poplar, in the county of Middlesex, Carpenter and Ship Joiner, for Improved arrangements for maintaining a level surface or level surfaces upon or in connexion with bodies subjected to a rocking motion.—Dated October 1, 1852. Sealed January 29, 1853.

233. WILLIAM CROOK, of Blackburn, in the county of Lancaster, Weaver, for Improvements in looms.—Dated October 5, 1852. Sealed January 29, 1853.

378. PRESTON LUMB, of Vauxhall, in the county of Surrey, Engineer, for Improvements in apparatus for cleansing coal.—Dated October 13, 1852. Sealed January 29, 1853.

587. JAMES ROCK, the younger, of Hastings, in the county of Sussex, Carriage Builder, for Improvements in railway carriages.—Dated October 30, 1852. Sealed January 29, 1853.

721. CALEB BLOOMER, of West Bromwich, in the county of Stafford, for Improvements in the manufacture of anchors.—Dated November 12, 1852. Sealed January 29, 1853.

895. EMILE MARTIN, of Paris, in the Republic of France, and of 4, South-street, Finsbury, London, Chemist, for Certain improvements in the mode of extracting gluten from wheat, and for preparing and drying the same by mixing to several degrees of concentration.—Dated November 27, 1852. Sealed January 29, 1853.

915. SAMUEL CLARKE, of 55, Albany-street, Regent's-park, in the county of Middlesex, Lamp and Candle Manufacturer, for Improvements in lamps.—Dated November 30, 1852. Sealed January 29, 1853.

932. WILLIAM TAYLOR, residing at 16, Oxford-terrace, Hyde-park, London, for Improvements in propelling ships and other floating bodies.—Dated December 2, 1852. Sealed January 29, 1853.

962. WILLIAM MAUGHAM, of Iffeld-terrace, in the county of Surrey, Chemist, for Improvements in rendering wood fire proof.—Dated December 4, 1852. Sealed January 29, 1853.

991. THOMAS LOVELL PRESTON, of Birmingham, in the county of Warwick, Machinist, for A machine for making links for chains.—Dated December 8, 1852. Sealed January 29, 1853.

1011. EDWARD THOMAS, of Gerrard-street, Islington, in the county of Middlesex, Horologist, for Improvements in the construction of timekeepers, and in cases to be applied thereto.—Dated December 9, 1852. Sealed January 29, 1853.

1013. GEORGE COLLIER, of Halifax, in the county of York, for Improvements in the manufacture of carpets and other fabrics.—Dated December 9, 1852. Sealed January 29, 1853.

1022. THOMAS BOARDMAN, of Pendleton, in the county of Lancaster, Overlooker, for Improvements in looms for weaving.—Dated December 11, 1852. Sealed January 29, 1853.

1031. GEORGE DIXON, of Birmingham, in the county of Warwick, for Improvements in the manufacture and refining of sugar.—Dated December 11, 1852. Sealed January 29, 1853.—(Communication.)

1036. JOSIAH GLASSON, of the Soho Foundry, near Birmingham, in the county of Warwick, Boiler Maker, for Improvements in boilers.—Dated December 13, 1852. Sealed January 29, 1853.

1045. HENRY CLAYTON, of the Atlas Works, Upper Park-place, Dorset-square, in the county of Middlesex, for Improvements in the manufacture of bricks.—Dated December 13, 1852. Sealed January 29, 1853.

1051. JOHN WEBB, of Coventry, in the county of Warwick, Manufacturer, for Improvements in ornamenting enamel watch dials.—Dated December 14, 1852. Sealed January 29, 1853.

767. JOHN RAMSBOTTOM, of Longsight, near Manchester, in the county of Lancaster, Engineer, for Certain improvements in steam engines.—Dated November 16, 1852. Sealed February 2, 1853.

978. JAMES SMITH, of 2, Little Canterbury-place, Lambeth-walk, in the county of Surrey, for Improvements in paving roads and other surfaces.—Dated December 6, 1852. Sealed February 2, 1853.

994. HENRY JENKINS, of 11, Spencer-street, Birmingham, in the county of Warwick, Die Sinker, Stamper, and Piercer, for Improvements in the manufacture of bracelets, brooches, and other articles of jewellery.—Dated December 8, 1852. Sealed February 2, 1853.

1000. JAMES LAWRENCE, of Westminster, in the county of Middlesex, for Improvements in the manufacture of projectiles.—Dated December 8, 1852. Sealed February 2, 1853.

1012. CHARLES GREENWAY, of Cheltenham, in the county of Gloucester, for Improvements in anchors.—Dated December 9, 1852. Sealed February 2, 1853.

1032. TIMOTHY MORRIS, of Birmingham, manufacturer, and WILLIAM JOHNSON, of Warkwood Heath, near Birmingham, Gentleman, in the county of Warwick, for Improvements in depositing alloys of metals.—Dated December 11, 1852. Sealed February 2, 1853.

1034. JOHN THOMAS WAY, of Holles-street, Cavendish-square, in the county of Middlesex, Professor of Chemistry, and JOHN MANWARING PAINE, of Farnham, in the county of Surrey, for Improvements in the manufacture of glass.—Dated December 11, 1852. Sealed February 2, 1853.

1044. DAVID NAPIER, of Millwall, Engineer, for Improvements in steam engines.—Dated December 10, 1852. Sealed February 2, 1853.

1046. WILLIAM HENRY FOX TALBOT, of Lacock Abbey, in the county of Wilts, for Improvements in obtaining motive power.—Dated December 15, 1852. Sealed February 2, 1853.

116. WILLIAM BOLIVAR DAVIS, of Southampton, Dealer and Chapman, for Improvements in ships' buoys, life buoys, ships' fenders, and other similar articles.—Dated October 1, 1852. Sealed February 7, 1853.

403. JEREMIAH DRIVER, of Keighley, in the county of York, Moulder, and JOHN WELLS, of Bradford, in the county of York, Moulder, for Improvements in moulding in sand and loam for the casting of iron and other metals.—Dated October 15, 1852. Sealed February 7, 1853.

450. GEORGE HEYES, of Blackburn, in the county of Lancaster, for Improvements in the manufacture of fancy woven or textile fabrics, and in the machinery or apparatus connected therewith.—Dated October 20, 1852. Sealed February 7, 1853.

519. MATTHEW FITZPATRICK, of Upper Cleveland-street, Fitzroy-square, in the county of Middlesex, Machinist, for Certain improvements in machinery or apparatus to be applied to locomotive engines and carriages for the prevention of accidents, and also in the manufacture and application of indestructible and non-rebounding cushions to be applied to the above, and for other similar purposes.—Dated October 25, 1852. Sealed February 7, 1853.

684. THOMAS DUNN, of Pendleton, near Manchester, in the county of Lancaster, Engineer, and WILLIAM WATTS, junior, of Miles Platting, near Manchester aforesaid, Assistant Engineer, for Improvements in the construction of railways.—Dated November 9, 1852. Sealed February 7, 1853.

933. JAMES ROTHWELL, of Heywood, near Manchester, in the county of Lancaster, Manager, for Certain improvements in looms for weaving.—Dated December 2, 1852. Sealed February 7, 1853.

971. FREDERICK MACKELLAR GOOCH, of Bolton-le-Moors, in the county of Lancaster, Engineer, for Improvements in the construction of railway signals, and in machinery or apparatus for working railway signals.—Dated December 6, 1852. Sealed February 7, 1853.

1005. EMILE KOPP, of Accrington, in the county of Lancaster, Professor of Chemistry, and FREDERICK ALBERT GATTY, of Accrington aforesaid, Manufacturing Chemist, for Improvements in printing

or dyeing textile fabrics.—Dated December 9, 1852. Sealed February 7, 1853.

1108. JUAN NEPOMOCENO ADORNO, of Golden-square, in the county of Middlesex, Gentleman, for Improvements in the manufacture of cigars, cigarettes, and other similar articles.—Dated December 20, 1852. Sealed February 7, 1853.

355. PETER WARREN, of Stratmore-terrace, Shadwell, in the county of Middlesex, Paper Maker, for An improved material applicable to many purposes for which papier machée and gutta percha have been or may be used.—Dated October 12, 1852. Sealed February 9, 1853.

476. SAMUEL MARSH, of Mansfield, in the county of Nottingham, for Improvements in the manufacture of woven fabrics by means of lace machinery.—Dated October 21, 1852. Sealed February 9, 1853.

650. JAMES WOTHERSPOON, of Glasgow, in the county of Lanark, North Britain, Engineer, for Improvements in the manufacture or production of confectionary, and in the machinery, apparatus, or means employed therewith.—Dated November 5, 1852. Sealed February 9, 1853.

753. ROBERT SANDIFORD, of Tottington Lower-end, near Bury, in the county of Lancaster, Calico Printer, for Certain improvements in apparatus for block printing.—Dated November 15, 1852. Sealed February 9, 1853.

757. THOMAS TAYLOR, of the Patent Saw Mills, Manchester, in the county of Lancaster, for Improvements in apparatus for measuring water and other fluids, which apparatus is also applicable to the purpose of obtaining motive power.—Dated November 15, 1852. Sealed February 9, 1853.

788. WILLIAM WILLIAMS, of Birmingham, in the county of Warwick, Patentee of electric telegraphs.—Dated November 19, 1852. Sealed February 9, 1853.

798. JEAN JOSEPH JULES PIERRARD, Manufacturer, of Paris, in the French Republic, for Improvements in preparing wool and other fibrous substances for combing.—Dated November 19, 1852. Sealed February 9, 1853.

826. FRANCIS BYWATER FRITH, of Salford, in the county of Lancaster, Manager, for Certain improvements in machinery or apparatus for dressing, machining, and finishing velvets, velveteen cords, beaverteens, and other similar fabrics, composed of cotton, silk, wool, and other fibrous materials.—Dated November 23, 1852. Sealed February 9, 1853.

850. WILLIAM HENRY WINCHESTER, of Tamertoñ Foliott, near Plymouth, in the county of Devon, and of Berners-street in the county of Middlesex, Surgeon, for Improvements in splints.—Dated November 24, 1852. Sealed February 9, 1853.

903. WILLIAM PINK, of Fareham, in the county of Hants, Saddler, for An improved construction of stirrup bar for saddles.—Dated November 29, 1852. Sealed February 9, 1853.

935. JAMES EDWARD M'CONNELL, of Wolverton, in the county of Buckingham, Civil Engineer, for Improvements in locomotive engines.—Dated December 2, 1852. Sealed February 9, 1853.

1069. RICHARD TAYLOR, Junior, of Queen-street, Cheapside, in the City of London, and JOHN ARTHUR PHILLIPS, of Upper Stamford-

street, Blackfriars, in the county of Surrey, for Improvements in treating zinc ores.—Dated December 15, 1852. Sealed Feb. 9, 1853.

1070. CLEMENT DRESSER, of Basinghall-street, in the City of London, for Improvements in combining materials to be used in substitution of whalebone and other flexible and elastic substances. —Dated December 15, 1852. Sealed February 9, 1853.—(Communication.)

1087. GEORGE SANDS SIDNEY, of the Willows, Brixton-road, in the county of Surrey, Gentleman, for Improvements in jugs or vessels for containing liquids.—Dated December 16, 1852. Sealed February 9, 1853.

1097. JOSEPH MATTHEWS, of Strickland-gate, Kendal, in the county of Westmoreland, Gun Maker, for A burglary gun.—Dated December 18, 1852. Sealed February 9, 1853.

1100. WILLIAM ROBERTSON, of Barrhead, in the county of Renfrew, Scotland, Machine-maker, for Improvements in certain machines for spinning and doubling cotton and other fibrous substances.—Dated December 18, 1852. Sealed February 9, 1853.

1115. WILLIAM JOHN SILVER, of 47, Clark-street, Stepney, in the county of Middlesex, for Improvements in giving motion to capstan and other barrels.—Dated December 20, 1852. Sealed February 9, 1853.

1116. GEORGE GWYNNE, of Hyde-park-square, in the county of Middlesex, Esquire, and GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, in the county of Surrey, Managing Director of Price's Patent Candle Company, for Improvements in the manufacture of candles, night-lights, and soap.—Dated December 20, 1852. Sealed February 9, 1853.

1136. THOMAS GREENSHIELDS, of Stoke Works, in the county of Worcester, for Improvements in the manufacture of alkali.—Dated December 22, 1852. Sealed February 9, 1853.

500. ARNOLD JAMES COOLEY, of Parliament-street, in the city of Westminster, Consulting Chemist, for Improvements in the manufacture of artificial light.—Dated October 23, 1852. Sealed February 12, 1853.

585. JOHN WHITCOMB and RICHARD SMITH, both of Kidderminster, in the county of Worcester, Foremen, for Improvements in the manufacture of carpets, hearth-rugs, and other similar fabrics.—Dated October 30, 1852. Sealed February 12, 1853.

611. ROBERT WILLIAM SIEVIER, of Holloway, in the county of Middlesex, Gentleman, for improvements applicable to the manufacture of hats, caps, bonnets, or other coverings for the head.—Dated November 2, 1852. Sealed February 12, 1853.

698. OSWALD DODD HEDLEY, of Newcastle-upon-Tyne, for Improvements in getting coals and other minerals.—Dated November 9, 1852. Sealed February 12, 1853.

944. PAGE DEWING WOODCOCK, of Lincoln, in the county of Lincoln, Chemist, for An improved preparation or pill for medicinal purposes hereby denominated "Page Woodcock's" wind pills.—Dated December 3, 1852. Sealed February 12, 1853.

1003. Sir JOHN POWLETT ORDE, of Kilmorey House, Loch Gilp Head, in the County of Argyll, Baronet, for Improvements in head gear for horses, and other like animals.—Dated December 8, 1852. Sealed February 12, 1853.

1063. GEORGE ELLIOTT and WILLIAM RUSSELL, both of St. Helen's, Lancashire, Manufacturing Chemist, for Certain improvements in boiling down saline solutions.—Dated December 16, 1852. Sealed February 12, 1853.

1132. FRANK CLARK HILLS, of Deptford, in the county of Kent, Manufacturing Chemist, for Improvements in purifying gas.—Dated December 22, 1852. Sealed February 12, 1853.

1150. PETER FAIRBAIRN, of Leeds, in the county of York, Machinist, and SAMUEL RENNY MATHERS, of the same place, Flax Spinner, for Certain improvements in machinery for carding flax, hemp, china-grass, and jute, and the tow of the several materials before mentioned.—Dated December 23, 1852. Sealed February 12, 1853.

1152. FULCAN PEYRE, and MICHEL DOLQUES, of Lodéve, Department of L'Herault, in France, for Improvements in machinery for dressing woollen cloth.—Dated December 24, 1852. Sealed February 12, 1853.

1107. WILLIAM EAST, of Spalding, in the county of Lincoln, Builder, for Improvements in machinery for crushing clods for dibbling, and drilling land and sowing seeds.—Dated December 18, 1852. Sealed February 14, 1853.

155. DAVID STEPHENS BROWN, of No. 2, Alexandrian Lodge, Old Kent-road, Surrey, Gentleman, for An improved means of navigating the water by ships.—Dated October 2, 1852. Sealed February 16, 1853.

387. JOSEPH MAJOR, of No. 13, Elizabeth-place, Ball's Pond-road, near Kingsland-gate, in the parish of St. Mary, Islington, in the county of Middlesex, for Removing spavins, ring-bones, curbs, splents, and other unnatural ossifications and humours from horses, which invention he names Major's "Celebrated British Remedy."—Dated October 14, 1852. Sealed February 16, 1853.

430. RICHARD ARCHIBALD BROOMAN, of the firm of J. C. Robertson and Co., of 166, Fleet-street, London, for Improvements in vices.—Dated October 18, 1852. Sealed February 16, 1853.—(Communication.)

525. MYERS MYERS, and MAURICE MYERS, trading as the firm of Myers and Son, and WILLIAM HILL, manager to the said firm, Steel Pen Manufacturers, all of Birmingham, in the county of Warwick, for Certain improvements in pens and penholders.—Dated October 26, 1852. Sealed February 16, 1853.

839. JAMES HIGGIN, of Manchester, in the county of Lancaster, Manufacturing Chemist, for Improvements in the manufacture of certain mordants used in preparing woven or textile fabrics for printing, staining, or dyeing them, and in the mode or method of using the same or other mordants for the said purposes.—Dated November 24, 1852. Sealed February 16, 1853.

980. ASA LEES, of Rhodes House, within Oldham, in the county of Lancaster, Machine Maker, and THOMAS KAY, of Numps, within Oldham aforesaid, Machine Maker, for Improvements in machinery for spinning and doubling cotton, wool, silk, flax, and other fibrous materials.—Dated December 6, 1852. Sealed February 16, 1853.

1071. THOMAS DUNN, of Pendleton, near Manchester, in the county of Lancaster, Engineer, HUGH GREAVES, of Manchester aforesaid, Engineer, and WILLIAM WATTS, junr., of Miles Platting,

near Manchester aforesaid, Engineer, for Improvements in machinery and apparatus for altering the position of engines and carriages on railways.—Dated December 15, 1852. Sealed February 16, 1853.

1161. GEORGE BOWER, of St. Neot's, in the county of Huntingdon, Ironmonger and Ironfounder, for Improvements in the manufacture of gas for illuminations.—Dated December 24, 1852. Sealed February 16, 1853.

1185. FRANCIS ALTON CALVERT, of Manchester, in the county of Lancaster, Engineer, for A universal ratchet drill.—Dated December 28, 1852. Sealed February 16, 1853.—(Communication.)

10. FREEMAN ROE, of the Strand, in the county of Middlesex, Hydraulic Engineer, for Improvements in valves and cocks.—Dated October 1, 1852. Sealed February 19, 1853.

109. WILLIAM AUSTIN, of Birmingham, in the county of Warwick, Engraver, and WILLIAM SUTHERLAND, of the same place, Decorative Painter, for Improvements in ornamenting glass.—Dated October 1, 1852. Sealed February 19, 1853.

296. ALFRED TRUEMAN, of Swansea, in the county of Glamorgan, Manager of Copper Smelting Works, for Improvements in obtaining copper and other metals from ores or matters containing them.—Dated October 7, 1852. Sealed February 19, 1853.

317. WILLIAM SCHOLFIELD, Engineer, and JOSEPH PRITCHARD, Boiler-maker, both of Oldham, in the county of Lancaster, for Improvements in steam-boilers.—Dated October 9, 1852. Sealed February 19, 1853.

877. THOMAS AINSLEY COOK, of Walls-end, in the county of Northumberland, Manufacturing Chemist, for Improvements in bleaching.—Dated November 26, 1852. Sealed February 19, 1853.

898. WILLIAM EDWARD SCHOTTLANDER, of Southwark, in the county of Surrey, Gentleman, for Improvements in machinery for boring the ground, stone, or rocks, for the formation of drains and sewers, for the laying of pipes underground, and for removing obstructions therein; also in the manufacture of pipes to be used in connexion with such machinery; and in instruments for surveying and levelling preparatory to the boring apparatus.—Dated November 27, 1852. Sealed February 19, 1853.—(Communication.)

918. JOSEPH SKERTCHLEY, jun., of Kingsland, in the county of Middlesex, and of Ansty, near Leicester, Engineer, for Improvements in mangles and mangle-rollers.—Dated November 30, 1852. Sealed February 19, 1853.

959. JAMES MURDOCK, of Staple-inn, in the county of Middlesex, for An improved galvanic battery.—Dated December 4, 1852. Sealed February 19, 1853.—(Communication.)

1001. ANTHONY NORRIS GROVES, of Madras, in the East Indies, and CONRAD WILLIAM FINZEL, jun., of Bristol, for Improvements in condensing steam or vapours.—Dated December 8, 1852. Sealed February 19, 1853.

1058. RUDOLPH APPEL, of 48, Gerrard-street, Soho, in the county of Middlesex, for Improvements in anastatic printing and in producing copies of drawings, writings, and printed impressions.—Dated December 14, 1852. Sealed February 19, 1853.

1068. ANTHONY NORRIS GROVES, of Bristol, in the county of Somerset, Gentleman, for Improvements in apparatus for heating,

drying, and evaporating.—Dated December 15, 1852. Sealed February 19, 1853.

1094. ALFRED KRUPP, of Essen, in the kingdom of Prussia, Cast Steel Manufacturer, for Improvements in cannons.—Dated December 17, 1852. Sealed February 19, 1853.

1096. JAMES LANGRIDGE, of the firm of George Langridge and Co., of Bristol, in the county of Somerset, Stay Manufacturer, for Improvements in the manufacture of stays.—Dated December 17, 1852. Sealed February 19, 1853.

1123. WARREN DE LA RUE, of Bunhill-row, in the county of Middlesex, for Improvements in preparing the surfaces of paper and card-board.—Dated December 21, 1852. Sealed February 19, 1853.

1128. EPHRAIM MOSLEY, of Grosvenor-street, in the county of Middlesex, Dentist, for Improvements in the manufacture of artificial masticating apparatus.—Dated December 21, 1852. Sealed February 19, 1853.

1149. JEAN LOUIS DAVID, Manufacturer, of Paris, in the French Empire, for Certain improvements in the manufacture of woollen fabrics.—Dated December 23, 1852. Sealed February 19, 1853.

1168. GEORGE INGHAM, of Rochdale, in the county of Lancaster, Carder, for Certain improvements in machinery for drawing cotton and other fibrous materials.—Dated December 27, 1852. Sealed February 19, 1853.

1171. GEORGE GWYNNE, of Hyde-park-square, in the county of Middlesex, Esquire, and GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, in the county of Surrey, Managing Director of Price's Patent Candle Company, for Improvements in treating fatty and oily matters.—Dated December 27, 1852. Sealed February 19, 1853.

1183. CLAUDE JOSEPH EDMEE JUNOT, of 15, Rue Basse Passy, in the Empire of France, for Improvements in the mode of reducing several metallic substances hitherto unused, and applying them so prepared to the plating of other metals and substances by means of electricity.—Dated December 28, 1852. Sealed February 19, 1853.—(Communication.)

1184. SAMUEL CLEGG, of 24, Regent's-square, in the county of Middlesex, for Improvements in apparatus for measuring gas.—Dated December 28, 1852. Sealed February 19, 1853.

1203. ROBERT STEPHEN OLIVER, of the City of Edinburgh, Scotland, Clothier and Hatter, for Certain improvements in waterproof and other garments.—Dated December 30, 1852. Sealed February 19, 1853.

14. CHARLES EDWARDS AMOS, of the Grove, Southwark, in the county of Surrey, Engineer, for Certain improvements in the construction of centrifugal pumps.—Dated January 3, 1853. Sealed February 19, 1853.

203. ROBERT HAZARD, of 14, Lincoln's-Inn-Fields, in the county of

Middlesex, Warming and Ventilating Engineer, for A caloric bath.—Dated October 4, 1852. Sealed February 22, 1853.

576. BOWMAN FLEMING M'CALLUM, of Govan Croft Dye Works, Glasgow, in the county of Lanark, Dyer, for A yarn-drying machine.—Dated October 30, 1852. Sealed February 22, 1853.

851. WILLIAM WILKINSON, of the town and county of Nottingham, Framework Knitter, for Improvements in the manufacture of looped and textile fabrics, and in machinery for producing the same.—Dated November 24, 1852. Sealed February 22, 1853.

1093. WILLIAM WILKINSON, of the town and county of Nottingham, Framework Knitter, for Improvements in the manufacture of looped-pile and cut-pile fabrics, and the machinery employed therein.—Dated December 17, 1852. Sealed February 22, 1853.

199. EDWIN BATES, of No. 7, Great Portland-street, London, in the county of Middlesex, Gentleman, for Certain improvements for deriving motive power from expansive fluids, and the better application and economy thereof, for propelling ships and other vessels in sea, river, and canal navigation; also in the shape and action of wind sails, the use of water as a motive power for driving machines, mills, &c.; the construction of turbines, air, and water pumps, marine pumps, for emptying ships of bilge water, and other useful purposes.—Dated October 4, 1852. Sealed February 23, 1853.

253. CHARLES DE BERGUE, Engineer, Dowgate-hill, London, for Certain improvements in machinery for punching metals and for riveting together metallic plates or bars.—Dated October 6, 1852. Sealed February 23, 1853.

258. DAVID CHALMERS, of Manchester, in the county of Lancaster, Manufacturer, for Improvements in looms for weaving web or cloth by power.—Dated October 6, 1852. Sealed February 23, 1853.

330. HENRY MOORHOUSE, of Denton, in the county of Lancaster, Tailor, for Improvements in machinery or apparatus for cleaning woollen, cotton, or linen rags, and waste, which machinery or apparatus is applicable to cleaning and tempering clay or other similar purposes.—Dated October 11, 1852. Sealed February 23, 1853.

625. JOHN CAMERON, of Manchester, in the county of Lancaster, Mechanic, for Improvements in boilers for generating steam, and in feed pumps and apparatus connected therewith.—Dated November 3, 1852. Sealed February 23, 1853.

560. ARTHUR ASHPITEL, and JOHN WHICHCORD, the younger, both of Carlton-chambers, Regent-street, in the city of Westminster, in the county of Middlesex, Architects, for Certain improvements in cocks, valves, and fire-plugs.—Dated October 29, 1852. Sealed February 23, 1853.

1188. JOHN WHICHCORD, the younger, and SAMUEL EGAN ROSSER, of Great Russell-street, Bloomsbury, in the county of Middlesex, Civil Engineer, for Certain improvements in the mode of burning and applying gas for light and heat.—Dated December 29, 1852. Sealed February 23, 1853.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 4. Vol. XXI. ENLARGED SERIES.—APRIL, 1853.

Specification of the Patent granted to John Frearson, *of Birmingham, for Improvements in Cutting, Shaping, and Pressing Metals, and other Materials.*—Sealed December 10, 1851.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists,

First, of improvements in combining machinery for cutting out or for shaping several discs or blanks of sheet metal and other materials at one time for the making of buttons and other articles.

Secondly, my invention consists of improvements in shaping and pressing metals and other materials in the processes of manufacturing into various articles. And in order that my invention may be most readily understood, I will proceed to describe the means pursued by me.

Description of the Drawing No. 1.

The machinery shown by various views of this drawing represents my improvements in combining machinery for

cutting out several discs or blanks of sheet metal and other materials at one time for the making of buttons and other articles.

Fig. 1, shows a front view of the machine.

Fig. 2, is an end elevation.

Fig. 3, a plan.

Fig. 4, is a vertical section taken through the line, A, B, in fig. 3.

Fig. 5, shows some of the parts separately.

Fig. 6, is a transverse section of the slide and tools taken through the line, C, D, in fig. 1.

Fig. 7, is part of a vertical section; and,

Fig. 8, a plan of part of the machinery.

The same letter and numeral in each figure of the drawing refers to the same parts. There are two movements in this machine. The object of one is to feed the material, A, (whether of sheet metal, woven fabric, paper, or other material,) into the machine, and the other movement is to give a reciprocating action to the punches, *a*, affixed to the vertical slide, D, for cutting out blanks of the shape and size required. The machine will be easily understood by tracing the parts which compose these two movements. The driving pulley or drum, O, the fly-wheel, V, the eccentric, J, and the worm, *b*, are all securely fixed upon the main shaft, N. The worm, *b*, which gives motion to the feeding apparatus has a projection or thread which extends nearly twice round its circumference, and freely fits into the spaces between the teeth of the wheel, *c*, fixed on the shaft, *d*. From *s* to *t*, this thread or projection runs in a spiral or inclined direction, and from *t* to *y*, and from *s* to *v*, at right angles to the shaft, N, fig. 5. The wheel, *c*, with the feeding apparatus, remains at rest whilst the right angle parts of the projection upon *b*, are passing between the teeth of the wheel, *c*. The incline or spiral portion moves the wheel, *c*, one tooth each revolution of the shaft, N. On the other end of the shaft, *d*, is the spur-wheel, S, in gear with the wheel, R, which is fixed upon the boss of the wheel, Q, which revolves freely upon the stud or pivot, X, taking with it the wheel, R. The wheel, Q, gears with the wheels, P, which are upon the roller shafts, U; on the other ends of the shafts, U, are the wheels, *l*, shown in fig. 1, in gear with the wheels, *m*, upon the shafts of the top rollers, C. The top rollers are caused to press tightly to the lower ones by the springs, *u*, and the screws, *k*, on

the blocks, *j*. It will, therefore, be seen that the sheet metal or other material is at all times held by the two pairs of rollers, C, C; and as they revolve at like surface speed, or so that the material will be kept tight and even between the nipping points of the two pairs of rollers, a much more correct and certain means of feeding sheet metal, woven fabric, paper, and other materials into a machine, in order to be cut by several punches, than can be obtained by using only one pair of feed rollers, and by the use of the peculiar screw motion, *b*, a great smoothness of action is obtained in this cutting machine. The eccentric, J, which puts in motion the cutting punches, *a*, has on its periphery the ring or strap, Y, with a part of the connecting-rod, I, affixed to it. The half of the bush, H, is screwed internally with a right hand, and the other half with a left hand thread, and the ends of I and G, of the connecting-rod are fitted into H, and locked with the nut, W. By turning this bush, H, the connecting-rod can be lengthened or shortened to compensate for the change of length or wear of the punches or tools, *a*. The end, G, of the connecting-rod is connected to the levers, F, by the shaft or pin, *e*, the other ends of these levers work freely upon the fulcrum pin, *g*, fixed in the framing, L. Near the middle of the machine, the levers, F, are fitted freely upon the ends of the shaft, *h*. Between the levers, F, upon the shaft, *h*, are tightly fitted the lower ends of the links, E, the upper ends are loosely fitted to the ends of the shaft, *i*, the middle of the shaft, *i*, being driven tightly into the slide, D, this slide is supported freely by the cheeks, M. The punch-holder, *f*, is fastened to the lower end of the slide, D, by means of four screws, L.

Figs. 4, 6, and 7, show the mode of securing the block, *f*, from moving side or endways by the flanges of *f*, clipping, D, fig. 4, and the flanges of D, clipping *f*, figs. 6 and 7.

Figs. 7 and 8, show the construction of the tools when for cutting circular discs, but they and the bed tools will be varied when for cutting out other forms. The punches, *a*, are held in the block, *f*, by the screws, V, fig. 4. The puller off, *q*, with the guides, Q, figs. 4 and 7, is fastened to the bed-holder or block, *p*, with two screws, T. The cutting out beds, *w*, are set correctly with the punches, *a*, and are firmly fixed to the bed, K, by the screws, S.

The steel bushes or bed tools which encircle the holes,

P 2

w, are tightly fitted into the block, *p*, and the holes to the punches, *a*, are secured to the block, *p*, by screws, as shown at fig. 8. The bearing, T, the frame, L, the bed, K, and the legs, Z, support the parts above described.

The action of this machine is as follows:—The main shaft, N, is caused to rotate by any suitable power applied by a strap to the drum or pulley, *o*, which puts the feeding apparatus and punches in motion. The material, A, required to be cut, is put in by hand at the commencement upon the table, B, between the guides, p^1, and pushed against the first pair of rollers, C, which move in the direction of the arrows, taking the material with them until it arrives between the punches, *a*, and the beds, *w*, the material remaining at rest while the punches descend into the holes, *w*, taking with them the blanks which fall down through the holes in the bed tools into a drawer or box under the machine. The punches then ascend, and the plate, *q*, liberates the punches from the waste material. The material is again fed on, and when at rest the punches again descend as before. I would remark that by altering the tools or dies this machine or one working similarly may be made suitable to draw through several blanks at one time.

I would remark in regard to this part of my invention that I make no claim to the mechanical parts and tools separately, they being similar to those heretofore used. This part of my invention consisting of the mode of combining the tools and parts into a machine.

Description of the Drawing No. 2.

These drawings show several views of a machine and parts thereof forming buttons from metal blanks. In each figure the same letters and figures are employed to indicate the same parts.

There are several movements in this machine. The first five of which movements actuate the punches, E, F, G, H, I, similar to that described in the foregoing description of the cutting out machine. Three of the movements give a downward action to the pegs or tools, K, J, L, the coiled springs around them pressing under the collars and against the plates screwed upon the bed, *c*, cause an upward motion according as they are permitted by the shapes of the cams upon the axis or shaft, F. The cams, *m*, *f*, *k*, actuate the levers, *d*, *h*, *g*, which are upon the spindle or axis, Z, and

the hooks of each lever being upon the studs, q^1, take with them the tools, K, J, L. Two movements work the pistons, U, in the pumps, V, one of which is only shown in the drawing at fig. 1, by the cams, 17 and 20, upon the main shaft, F, in contact with the levers, Q and R, which move upon the studs, X and W, such levers being connected to the piston-rods, T, by the links, S.

I will now proceed to describe the second part of my invention, which consists of employing pneumatic and other apparatus to feed suitable blanks of metal to be cut, shaped, and pressed into form by machinery.

The drawing shows this part of my invention arranged for feeding metal discs or blanks into machinery, suitably arranged for forming a certain description of metal buttons, each button being composed of two discs.

But I would remark that it is new to apply pneumatic apparatus for feeding metal blanks of any form into machinery so as to be further cut, bent, or shaped, and it will be evident from the description hereafter given, aided by the drawings, that this mode of taking and feeding metal blanks may be employed in other machinery provided with suitable apparatus for acting on metal blanks to cut or to form them into other forms of buttons or other articles, depending on the nature and action of the particular machinery, and it constitutes part of my improvements thus to take up and feed in blanks of metals into machines by means of pneumatic apparatus.

Two movements cause a to-and-fro action of the horizontal slides, *j* and *q*, which carry the pneumatic feeders, *y* and *x*, and slides, X, X, and W*, W*, which are at right angles to the slides, *j*, *q*, and they hold the four pair of fingers or carrying tools, *s*, s^1, and *r*, r^1; *y* and *x*, are the feeders, they are plates recessed on the underside, according to the size and form of blank, and these recesses are connected to the pumps, V, by means of the flexible tubes, *u*. From the pumps there are air passages, u^1, with valves, u^2, through which the air is forced out of the pump barrels, and there are other passages, u^3, through which the air passes into the pumps, these openings can be regulated according to the degree of vacuum required for the particular blanks, which are for the time being used.

For this purpose the passages have valves which open inwards, and they are kept up to their seats by means of springs, and according as such springs are adjusted by

screws to act more or less strongly, so will be the quantity of air which will enter the pumps as the pistons move; these valves and passages are not all shown in the drawing, but are well understood. The cams, 21 and 22, actuate the studs, *y**, in the lower levers, *z* and *s*, these levers are secured to the spindles, *t*, which work freely through the bosses, *y*. Near the upper parts of these spindles, *t*, are squares, and the bosses of the top levers, *z* and *s*, are secured thereon by nuts. These levers are connected to the slides, *j*, *j*, and *q*, *q*, by the links, *u**.

Two motions actuate the carrying fingers, *s*, s^1, and *r*, r^1. The cams, 18 and 19, act upon the levers, *a* and *b*, which work freely upon the spindle, z. The lever, *b*, is connected to the lever or arm, *m*, fixed on one of the shafts or spindles, *l*, *l*, by means of a connecting-rod, *p*, and on the other spindle or shaft, *l*, there is an arm, *n*, which by a screw-point rests on the arm or lever, *m*, and thus is motion given to both the shafts or spindles, *l*, *l*. The spindles or shafts, *o*, *o*, receive motion in like manner from the lever, *a*, by a connecting-rod, *i*, attached to the arm or lever, 24, the arm, 25, fixed to the other axis, *o*, by a screw-point in contact with the lever, 24, is thus simultaneously put into action. The springs, *z**, constantly tend to cause the fingers, *r*, r^1, *s*, s^1, to advance towards each other to hold the blanks whilst being carried from one die to the other. In order to cause the fingers, *r*, r^1, *s*, s^1, to move away from each other, the cams, 18, 19, act on the levers, *a*, *b*, and cause them to move the spindles or axes, *l*, *l*, *o*, *o*, on which are fixed arms, *m**, to which are fixed bars, *m***, along or against which the slides, x and w*, move, so that when the bars, *m***, are caused to be opened out or move away from each other they separate the fingers connected to these slides.

I would remark that similar arrangements of fingers and apparatus may be applied in carrying parts of other constructions of buttons between the succeeding processes, making such variations as to suit the forms of the parts and the dies or tools to and from which the parts are to be carried.

The blank-lowering apparatus consists of a cam, 16, acting against the suspended lever, 7, moving upon the axis, 13, having on it the regulating joint, 9, and strap, 6, to which the connecting-rod, 5, is attached; the detent or click lever, 4, which gives motion to the ratchet-wheel, o^1,

is upon the levers, 3, which works freely upon the shaft, M, on each side of the ratchet-wheel, o^1. The detent, 4, moving the ratchet, o^1, in the direction of the arrow, thereby lifting up the counter weight, 26, thus causing the rams, w^1, and the cross head, U, to descend with the blanks in the tubes, V. When the connecting-rod, 5, moves in the direction of the arrow, the levers, 3, come in contact with the stop, 27, thereby throwing the detent, 4, out of the ratchet-wheel, o^1, and releasing the weight, 26, causing the blanks again to ascend to be pressed into the pneumatic feeders, y and x.

It should be remarked that in the form of button shown to be made by this machine the two discs or blanks are of the same thickness; the two rams, w^1, can therefore be combined and worked together, but in applying this part of my invention to feeding, under other circumstances, particularly where the discs, blanks, or parts, are of different thicknesses, then the rams, w^1, of the several tubes containing the supply of parts should be arranged to work separately, so that each may supply its blank or part independently of the others; and although in the arrangement shown metal blanks are only required, like arrangements of tubes, rams, w^1, and pneumatic or paper-feeding apparatus may be employed in other machines arranged for supplying blanks of woven fabric for covering or forming parts of buttons. And I would further state that in cases where pneumatic apparatus is employed to feed in blanks of woven or flexible fabric, such as for the covering of buttons, it will be desirable to coat one side with thin paper or otherwise to make it impermeable to the air, in order that the pressure of the atmosphere may act properly when a partial vacuum has been obtained.

The apparatus for conveying the finished article from the machine is as follows:—The cam, l^*, the lever, j^*, upon the spindle, Z, with the connecting-links, 1, and the tube, h^*. The frame, D, is secured to the base plate, C, and is in two parts for the purpose of more conveniently planing the five grooves which hold the slides, D, and the setting-up cheeks, p^*. The two halves of D are firmly held together by bolts, and are kept in the right positions by keys half in one and half in the other, as seen, fig. 5. The bearings, Z and B, upon D, sustain the five levers, O, and the axle-pin, A; the spindles or shafts, l, l, and o, o, with the levers are upon D; the hanging bearers, E, bolted to the

base plate, C. The bearings, R, are screwed to the base plate, C, at the underside and support the cross head, Q, the rod, T, in the boss, P; and U, which slides freely upon T. The brackets, Y, support the spindle or axis, Z, also the levers, *a*, *d*[1], *h*, *j**, *g*, *b*, and the axes of Q and R. The branches, S, support the tubes, V, with semi-flanges, which pass through the slots in S, and by turning the tubes a quarter round they are secured in a vertical position. The tubes, V, receive the rams, W[1], which are a little less than the diameter of the blanks in the tubes. The tops of the tubes are fitted to the bed, C. The action of this machine may be described thus:—The main shaft, F, is put in motion in the direction indicated by the arrow on the fly-wheel, A. The blanks suitable for the backs of buttons are pressed up into the mouth of the pneumatic feeder, *y*, by the ram, W[1], so that the upper blank will enter the recess on the underside of the pneumatic feeder, *y*, and the blanks for the fronts of buttons are pressed up into the feeder, *x*. A partial vacuum being obtained by the pumps the top blank from each tube is retained by atmospheric pressure in the recess of its pneumatic feeder; the remainder of the blanks will descend out of the way when the rams descend, and the slides, *j*, will take the blank which is to form the front of the button over the piercing die, *g*, and the slides, *q*, will take the blank for the back of the button over the piercing die, *a*. The valves, u^2, open as the pistons reverse and the blanks drop into the dies. The slides, *j* and *q*, go back for more blanks and the punches descend and pierce the blanks. The punches then ascend and the fingers, *r*, *s*, which are to be made on their undersides with recesses, so that they will hold the blanks securely, and in order to prevent the blanks going up with the punches these fingers come over the upper surfaces of the blanks and embrace the punches, so that the punches may go away, leaving the blanks in the recesses of the fingers.

The slides, *j* and *q*, advance again towards each other, taking other blanks to the piercing dies, and the pierced blanks are taken by two pairs of the fingers, *r*, *s*, over the dies, *d* and *b*. The centre peg or tool, K, ascends into the pierced holes of the back for the button whilst it is in the fingers, *r*, and the centre peg or tool, J, rises and enters the holes in the front for the button whilst in the fingers, *s*. Each pair of fingers open and the centre pegs or tools, K

and J, descend and conduct the perforated blanks on them into the dies, *b* and *d*. The punches descend into the dies, *b* and *d*, and shape the front and back parts of the button therein into the form required. The punches ascend, and the centre pegs or tools, K and J, rise and lift the parts of a button out of the dies, *b*, *d*, to the height of the middle pairs of fingers, s^1, r^1, which respectively take hold of the front and back parts of a button, and after the peg, J, is drawn out the fingers, s^1, carry the front part of the button over the finishing die, *c*. The peg, L, rises and enters the centre holes in this part of a button and the fingers, s^1, open, the peg or tool, L, descends with the front part of the button on it into the die, *c*, and the slide, *j*, with the fingers, *s*, s^1, and the blank feeder, *x*, return for more, and the slide, *q*, with the fingers, *r*, r^1, advance, taking the back part of the button over the front part of the button in the die, *c*. The peg or tool, L, ascends with the front part of the button on it and enters the centre holes of the back part of the button, and the fingers, r^1, open, and the slide and feeder return. The peg or tool, L, again descends and conducts the front and back part of a button into the die, *c*, and the punch, G, finishes the button, and at the same time, E and I, pierce a back and front for another button, and F and H, shape back and front perforated blanks for another button. The tool, L, descends below the face of the die, *c*, and out of the finished button the tube, *h**, rises, and the fingers, s^1, advance with another front and push the complete button from the die, *c*, into the tube, *h**, through which it falls to the front of the machine.

I will now describe another arrangement of machinery according to this part of my invention; it has for its object the making short tubes out of discs or blanks suitable for the making of metal eyelets for healds or headdles, and other uses.

Description of the Drawing No. 3.

Figs. 1, 2, 3, and 4, represent a machine for making the tubes shown at fig. 22. The hoops or tubes are then to be annealed, and the machine shown by figs. 11, 12, and 13, shapes the hoops or tubes into sheaves or pulleys. The sheaves are then annealed, and the machine represented by the figs. 8, 9, and 10, shapes them into oval eyelets, if that shape be required. The same letters and numerals in each figure of the same machine refer to the same parts.

There are four pressing motions in the hoop or short tube making machine, which act simultaneously. The cams, *a*, upon the shaft, B, actuate one end of the levers, *c*; the other ends being in the slots, *d*, fitted to the steel pieces, *e*, in the slides, *f* (shown in fig. 4), cause a vertical to-and-fro motion to the punches, *g*. The mouths of the pneumatic feeders, *h*, are fixed upon the sliding frame, *i*. These mouths are moved from over the tubes, *j*, to the dies, *k*, by the lever, D, acted on by the cam, E, and in the opposite direction by the lever, F, acted on by the counter cam, G. The slide, I, also carries the arm, J, which moves the bar or slide, K, and the removing tools, *m*. The removing and forming tools, *u*, in the sliding bolts, *o*, are actuated by the levers, *p*, upon the spindle or axis, *q*, by the ram, *r*. The principle of the pneumatic apparatus partially shown in this machine, and also the blank liberating apparatus, have been described in regard to the previous drawings, and will therefore, without further description, be understood. The bed, M, legs, N, and standard, O, support the parts above described.

The counter motions in these machines, and in fact in all the machines described in this specification, are caused by springs where counter cams are not named. Figs. 4 and 16 show how the punches are secured and regulated.

I will now describe the action of this short tube making machine. A blank is taken from each tube, *j*, by atmospheric pressure, and they are then placed in the dies, *k*, by the feeders, which afterwards return for more blanks, and the punches, *g*, descend and "draw" the blanks through the dies, *k*. The punches descend further, until they arrive at the beds (4), and the same punches act on or pierce the metal and thus produce tubes. The bits cut or pierced out fall down the tubes, *s*. The punches ascend, and the lower part of the dies, *k*, pull off the hoops or tubes from the punches. The horizontal tools, *u*, advance and take with them the hoops or tubes to the fixed tools, *n*, where the tubes are pressed into an oval shape, if required. The tools, *u*, retreat, and the tubes are removed from the tools, *n*, by the tools, *m*, to the holes, V, down which they descend to the front of the machine. If the hoops or tubes are required to be cylindrical as the piercing tools leave them, the arm, J, and the tools, *m*, are to be removed from the machine, and the hoops or tubes will be conducted to the holes, X, by the tools, *u*, instead of to the holes V.

Figs. 11, 12, and 13, represent a sheave making machine, the peculiarity of which consists of combining parts into a machine in such manner that short tubes may be converted into sheaves, the machine supplying the tubes to and taking the sheaves from the tools, in place of operating by hand on each tube by similar tools as heretofore; and

Figs. 14, 19, and 20, show the tools separately. The cam, M, upon the driving shaft, G, actuates one arm of the lever, F, another moves to and fro the vertical slide or pressing bolt, *m*, in the boss, B, the other acting against the regulating screw in one end of the lever, D, causes a to-and-fro motion to the sliding part, *k*, of the tool, *h*, in the boss, *b*, opposite to the slide, *m*, of the tool, *o*. The links, *c*, connect *k* with D. The three-branched lever, F, moves freely upon the pin, *d*, supported by the standard, B; the small boss, *n*, is screwed or fixed to the side of the standard, B; the lower ends of the tubes, *e*, e^1, are fitted into *n*; the collars of the tubes rest upon *n*, *n*. There are two pressing motions which act alternately, the parts being marked as just described. K, the feeding cam; H, the feeding lever is connected to the feeding slide by the stud, X; the slide, *y*, is worked to and fro, and has on each end a tool or finger, *r*; the spring fastened upon the levers, *f*, moves the slides, *g*, and tools or fingers, *u*, till they are stopped by the screws, *h*, coming against the bed, A. The bed, A, the brackets, R, and bearings, C, support the parts described. The tubes, *e*, e^1, are filled with annealed hoops or tubes by hand, and they rest upon the tools or fingers when under them; the slide, *y*, is caused to move from the tube, *e*, and the tubes or hoops therein drop to the face of the bed, A. The slide, *y*, then advances towards the tube, *e*, and one of the fingers, R, takes with it the hoop or tube, and also the tool or finger, *u*, until the hoop or tube arrives opposite to and between the punches, *o* and *p*. The fingers, *r* and *u*, are so adjusted as to hold a hoop or tube without bending it. The punches are now caused to advance towards each other, and to turn the two edges of the metal over until they clip the fingers, *u* and *r*, as seen at fig. 19. The tool, *o*, now ascends, and the tool, *p*, descends out of the way; and the split tool or fingers, *s*, advances towards the front of the machine, and at right angles to the slide, *y*, clipping the finger, *r*. The slide, *y*, goes back for another hoop, and the fingers, *s*, liberate the sheave and push it to the front of the machine.

Figs. 8, 9, and 10, represent a machine for ovaling the sheaves, the peculiarity of which consists of the combining mechanical parts into a machine in such manner that (annealed) sheaves are fed into and moved from the tools by the action of the machine itself, in place of using like tools and supplying the sheaves by hand as heretofore; fig. 15 being the tools on a larger scale separately. A, the main shaft in the bearings, G, upon the bed, B; the cam, D, works the slide, H, and the removing tool, *a*. The feeding slide, *p*, which carries the tool, *o*, is moved to and fro by the cam and counter cam, *c*, acting upon the stud in the end of the lever, *g*, the connexion being formed between the slide *p* and *g*, by the brick, *h*; *b*, is a fixed tool; *k*, is a hollow block secured to the bed, B; *m*, is a tube or hopper fitted in *l*. The tube, *m*, is filled by hand with annealed sheaves, which rest upon the bed, B. The slide, *p*, advances towards the sheave, and the tool, *o*, takes it to the tool, *b*, and presses it into the shape required; *o*, goes back sufficiently to allow the tool, *a*, to pass between *o* and *b*, while it removes the oval sheave towards the tube, *d*. The knocker-off, *a*, returns out of the way, and *o* goes back for another. The other end of the slide, *p*, with the parts described as above, performs a like operation. The eyelets being then put in the headdles by hand may be closed therein as heretofore.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details herein described, as the same may be varied, so long as the peculiar character of any part of my invention be retained.

But what I claim is,

First, the mode of combining parts into a machine herein described for cutting out, and for shaping several discs or blanks of sheet metal and other materials at one time, for the making of buttons and other articles; and

Secondly, I claim the improvements herein described in combining parts into machines for shaping and pressing metals and other materials in the processes of manufacturing the same into various articles.—In witness, &c.,

JOHN FREARSON.

Enrolled May 10, 1852.

Specification of the Patent granted to Alfred Charles Hobbs, *of New York, in the United States of America, Engineer, for Certain Improvements in the Construction of Locks and other Fastenings.*—Sealed February 23, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention relates to a novel mode of constructing certain parts of locks by means of which the possibility of feeling the position of the gating of the tumblers by applying pressure to the bolt is prevented.

Another part of my invention consists in a novel arrangement or construction of parts whereby the key or instrument which operates upon the tumblers to bring them into a proper position preparatory to throwing the bolt is carried into the lock, and the key-hole is effectually closed while the key or other instrument is so acting upon the tumblers.

I will now proceed to describe, by reference to the accompanying sheets of drawings, certain arrangements and apparatus for the purpose of attaining the above-mentioned and other improvements in the construction of locks.

In Sheet No. 1, I have shown a means of preventing any person from feeling the position of the gating of the tumblers, which is usually done by applying pressure to the bolt.

This improvement, which forms part of my invention, consists in applying a moveable "stump" to the bolt, which "stump" when pressure is applied to the bolt will be brought into contact with the face of the tumbler, but instead of binding the tumblers and holding them fast, as is usually the case, the stump by being made moveable will yield and leave all the tumblers free, but yet holds the bolt securely and prevents it from being thrown back.

In the figures in Sheet No. 1, I have shown several methods of effecting this object.

In fig. 1, A, is the case of the lock; B, B, the bolt; E, the tumbler stump attached to the piece, F, which moves on the centre, G, on the back or underside of the bolt; H, is an additional stump or stud riveted into the case of the lock; D, is a dog or lever that catches into a notch in the bolt when it is locked out, as shown in fig. 2.

Fig. 3, shows the lock unlocked with one tumbler, C, C, attached.

Fig. 4, represents the lock locked, and also with one tumbler adapted to the lock to illustrate the object of the improvement. Upon pressure being applied to the bolt when the lock is locked, the dog, D, being previously released, the stump, E, will be brought against the face of the tumbler, C, unless the tumbler is raised by the proper key, and by being thus brought against the tumbler, the piece, F, to which the stump is attached will turn on its centre, and its tail being raised will abut against the fixed stump, H, thereby preventing the bolt from being shot back, but leaving the tumbler free to act or move up and down, thereby preventing the possibility of feeling the obstruction that would otherwise be offered by the tumblers.

Fig. 6, represents the same object, effected in a somewhat different manner. In this case, the stump, E, is attached to a latch or moveable piece, F, which works on the centre, G, on the outside of the bolt. Should pressure be applied to the bolt, in this instance, the stump will be brought against the tumbler, but it will rise up and fall down with the tumbler, and therefore as it will not hold the tumbler in the position which the latter occupied when the stump was first brought into contact with it, it would be impossible to find out the position of the gating.

A similar effect may be produced by adopting the plan shown in fig. 7, which represents a portion of a bolt with a roller or moveable piece, I, attached to and working in the face of the stump, E; and,

Fig. 5, represents a portion of a bolt with a moving collar, I, fitted to and moving on the stump, E. The employment of either of these plans will render it impossible to hold any of the tumblers in a given position by applying pressure to the bolt.

Fig. 8, represents a key which may be used with either of the locks.

A similar object may be effected by the employment of a compound or double-tumbler, as shown in figs. 9 and 10.

Fig. 9, represents a compound or double-tumbler having a small tumbler, B, working on the pin, D, which is attached to the large or principal tumbler, C, C.

Fig. 10, shows a section of the double-tumbler. Should pressure be applied to the bolt the stump will bear against the face of the small additional tumbler, B, which will turn

or move on its centre, leaving the main tumbler at liberty to move.

Another improvement whereby all access to the internal parts of the lock is prevented while the key or other instrument is operating on the tumblers, is shown in Sheet No. 2, figs. 1 and 2, which represents an improved mode of constructing and working a moveable curtain or revolving chamber, whereby the key-hole is completely and effectually closed instead of being only partially so, as has hitherto been the case, during the operation of the key upon the tumblers. The revolving chamber or curtain moves on the centre, A, and the key which merely consists of the bit, shown at fig. 5, is inserted in the key-hole, B, and the curtain or chamber being turned by a knob handle or key applied to the spindle, A, the key-bit will be carried round by the chamber or curtain into the lock, and the hole completely closed by the solid part of the curtain. By this means all access to the interior of the lock is effectually prevented.

When the lock is unlocked and the key-bit is required to be withdrawn, this is done by bringing the bit round opposite the key-hole, when a small spring at the bottom of the hole will push the bit out, or it may be withdrawn by a handle, as shown at figure 4.

Fig. 3, shows the handle with the key-bit attached. It will therefore be evident that any instrument to open the lock must be carried out of the operator's hand into the interior of the lock, as it will be impossible to act upon the tumblers until the curtain or revolving chamber is brought round, and made to completely close the key-hole. In contradistinction, therefore, to ordinary safety locks, the bolt is not shot, nor the lock unlocked by a key of ordinary construction, but simply by means of a knob-handle or other instrument, applied to the spindle, A, of the revolving chamber or curtain, the internal parts of the lock upon which its safety depends having been first brought into the proper positions by means of a key "bit," or other instrument properly constructed, to suit the particular combination of the lock.

Flush-Bolt Portable, or Camp Desk Lock.

The advantages of this lock over those in general use are these, that the bolt descends flush with the selvage when the lock is unlocked, and when in the act of locking first ascends vertically from out of the selvage, until it arrives at

the proper height of the link, then, with an horizontal motion, slides under the link, as in the ordinary method of the common link plate lock.

The bolt, then, has two motions given it, horizontal and vertical, which are accomplished with one set of tumblers, or slides, in the following manner:—

Sheet 2, figure 6, represents the bolt and case of a lock, when locked.

Figure 7, represents the bolt locked.

Figure 8, represents the bolt locked with one tumbler attached. C, is the bolt pierced with three right angular slots, D, D, D; E, E, E, are three square stumps, or studs, firmly rivetted into the plate, F, forming guides for the bolt. The two motions given to the bolt by the slots traversing these fixed stumps, gives the vertical and horizontal motion before mentioned. G, is a feather spring, which acts to throw the bolt down into the selvage of the lock; H, is the drill pin for the centering of the key, supposing the bolt to be down, as in figure 6, and the key brought to bear against the talon of the bolt; at the point, I, it will lift the bolt in opposition to the spring, G, and give it its vertical motion, until the bolt is lifted to its proper height, when the key will pass into the circular part of the talon, when action will cease, until the key finds its way into the notch at the head of the talon, when the horizontal motion is given, and the bolt shoots into the link-plate; J, is one of the tumblers, or slides, whose motion is vertical, moving in the shots, K, K, on the square stumps, E, E, E, which project up through the bolt for that purpose; L, is the racking or gating through which the main stump, M, of the usual construction, passes; N, is the spring to throw the tumblers to their places, when raised by the key.

Figure 9, is the link-plate.

Figure 10, sheet 2, represents a new method of constructing a link-plate cupboard lock, instead of having the link enter the selvage, and the bolt shoot out of the case of the lock, as has heretofore been the case; the links, O, O, as shown in figure 11, enter the case of the lock at the apertures, as shown at P, P, figure 10, by which means the lock may be made to occupy much less space on the door.

Having thus described the nature and action of my improvements in locks, I claim, as of my invention,

Firstly, the use and application of a moveable stump to the bolt, or attaching a moveable piece to the stump, or the

stump to a moveable piece, for the purpose above described, and shown in the several figures in sheet No. 1.

Secondly, I claim the use of a compound or double tumbler, as shown in figures 9 and 10, sheet No. 1, for the purpose above described.

Thirdly, I claim the arrangement shown in sheet No. 2, figures 1 and 2, or any modification thereof, either by circular parallel motion, by which the bit of the key is carried into the lock, and made to operate upon the tumblers, so as to bring them into a suitable position, preparatory to shooting back the bolt, the key-hole being completely closed while the key-bit is operating upon the tumblers.

Fourthly, I claim the constructing of a lock, with a bolt having a series of right angular slots, moving both vertically and horizontally, operating with a single set of slides or tumblers, as shown in sheet No. 2, figures 6, 7, and 8, or any modification of the same for the purposes before named.—In witness, &c. ALFRED CHARLES HOBBS.

Enrolled August 21, 1852.

Specification of the Patent granted to THOMAS HUNT, *of Leman-street, Goodman's-fields, Gun Maker, for Improvements in Fire-arms.*—Sealed August 19, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.

My invention consists,

First, in breech-loading fire-arms, and,

Secondly, my invention consists of improvements applicable to double barrel fire-arms. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawings.

The nature of each of the views shown by the several figures of the drawings being written thereon it will not be necessary to repeat the same here, and it will only be necessary to remark that the same letters are used in the several figures to indicate the same parts.

Figs. 1 to 11 inclusive show the improvements in breech loading fire-arms; and,

Figs. 12 to 17 inclusive show the improvements applicable to double barrel fire-arms.

I will now proceed to describe the first part of my invention: *a*, is what is called the lock, as it contains the spring and the needle which discharges the fire-arm. This instrument and apparatus is somewhat similar to what has been before employed in breech loading fire-arms, but it differs in respect to the means by which it is secured in place within the sliding bolt, formerly a screw being used to retain the sliding bolt and it together, but by the peculiar construction of the instrument shown the use of a screw for such purpose is dispensed with, the gear or lever spring retains it in its place, and the apparatus is thus simplified; *b*, is the needle which discharges the fire-arm as heretofore, but it is retained securely in the lock, *a*, by means of a stud, b^1, which enters into a groove around the head of the needle, there being a longitudinal groove on the opposite side of the head by which the head can be slided into position within the lock, *a;* and then by turning the head into its true position it cannot be forced out of the lock, *a*, by the spring, and it can only be taken out by turning the needle and its head so that the longitudinal groove will pass over the internal stud: this holding of the needle within the lock is important as it prevents its being forced out suddenly by the spiral spring when the lock is taken out of the sliding bolt, *b*, and the top spring be taken off for the purpose of cleaning or oiling. The form of the lock, *a*, both in respect to its exterior and interior, is clearly shown in the drawings.

The hollow sliding bolt, *b*, is very similar to those before employed and described in a former patent, but in place of having the handle, b^1, fixed and at all times projecting from the bolt, I make the handle, b^1, capable of being folded down, which is very advantageous, and I cause the folding to depend on a bolt, b^2, constantly pressed on by a spiral spring with a tendency to shoot it into a hole in the fixed axis, b^3, such bolt has a head by which it can be moved out of the axis, as will readily be understood on examining the drawings; *c*, is the case for the sliding bolt; this case is very similar to those before employed for such purposes, but the retaining of the bolt therein is improved by dispensing with a screw and employing the spring, *d*, to retain these parts together: this is important as it admits of all parts being taken to pieces without

the aid of instruments. The drawing shows the several parts by which their forms and modes of going together will readily be traced; *e*, is the sear in the sliding bolt, which is very similar to those used in like guns, but much simplified. The trigger spring, *f*, is differently constructed and arranged to those heretofore used, it being placed at the back of the trigger as shown, by which an improved arrangement is obtained, and several parts dispensed with; *g*, is a revolving case which covers the case of the sliding bolt entirely; this case is formed as shown in the drawing, and fits correctly, but is capable of turning on the fixed case of the sliding bolt, *b*. This revolving case, *g*, closes or covers the whole works or apparatus, and excludes rain or wet passing into the various parts or apparatus contained in the fixed case of the sliding bolt. This case, *g*, constitutes an important improvement, especially as it is unattached from the sliding bolt, and when the arm is in use can be slided round to the under side of the case. I would remark in respect to this first part of my invention that the fire-arm to which the improvements are applied resembles what is called the Prussian gun, and also similar ones which have been made having variations therein, for some of which variations letters patent have before been obtained. My improvements in such class of fire-arms will readily be understood from the description thereof here given, aided by the drawings.

I will now proceed to describe the second part of my invention.

Fig. 12, shows the two breeches of a double barrel fire-arm separately.

Fig. 13, shows the two breeches together, there being but one "hut" for the two breeches, with such "hut" coming intermediate of the two breeches as shown. The breech without the "hut" is first screwed into its place in its barrel, and then the one with the "hut" thereto is to be screwed in its place; and the form of the breeches will, as is shown in the drawing, admit of the two breeches going together, the one with the "hut" thereto overlapping the other, thus bringing the "hut" into a central position in place of having a "hut" for each breech.

Fig. 14, shows an elevation; and,

Fig. 15, a side view of apparatus for removing the breeches of fire-arms. The barrels, *x*, *x*, are held between the cramping surfaces, *h*, *h*, which have grooves therein

lined with wood as shown in the drawing, by means of the screws, *i*, *i*. The "hut" of the breech is received into a recess in the bar, *j*, and by simply turning the screw, *k*, motion will be given to the end of the bar at j^1, which will readily start the breech, and the remainder of the unscrewing will readily be accomplished by the bar, *j*. In using this apparatus for a breech without a "hut," such as before described, then the end, j^2, of the bar, *j*, is used, there being a projecting stud, j^3, which enters a recess in the breech, and there is a screw, j^4, which enters into the nipple hole, such screw being carried by an arm, j^5, which is fixed by the screw, j^6, to the bar, *j*, as shown, there being a forked end to the arm, j^5. I would remark that heretofore the barrels have usually been placed in a vice, and a bar or wrench used to remove the breeches. The peculiarity of this apparatus consists in the use of a portable screw clamp with a screw thereto for giving motion to the bar, *j*.

Fig. 16, represents my improvement in preventing the accidental discharge of fire-arms. This can be done at either the full or half cock of the gun.

Fig. 17, a plan. The sliding bow, *l*, has a sliding bolt, *y*, attached to one end by means of a small screw passing through a slot in the guard into the bow; *m*, is a spring attached to the guard by a screw, the other end falling into a notch in the bolt, *y*, the bolting is effected by a pressure on the back end of the sliding bow, the bolt is thus projected in the triggers at *y*, *y*, rendering them immovable. The unlocking is effected by a slight pressure of the left hand on the fore part of the sliding bow when the gun is thrown up to fire; *n*, shows the mode of attaching the fore end of the sliding bow with a metal washer or slide, *o*.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that I do not confine myself to the precise details herein shown or described, so long as the peculiar character of any part of my invention be retained.

But what I claim is,

First, the improvements herein described in breech loading fire arms, and,

Secondly, I claim the mode of making breeches of double barrel fire-arms and also the apparatus herein described for removing and fixing breeches and,

Thirdly, I claim the means of forming a safety bolt, as shown and described in respect to figs. 16 and 17.—In witness, &c.

THOMAS HUNT.

Enrolled February 19, 1853.

Specification of the Patent granted to JULIUS ROBERTS, *of Portsmouth, Lieutenant in the Royal Artillery, for Improvements in the Mariner's Compass.*—Sealed August 23, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention consists of balancing a magnet from either of its extremities, by which the end most remote from the centre of suspension is either attracted or repelled by the proximity of iron or other ferruginous matter, and applying such suspended magnet to a compass needle, and obtaining adjustment by one or more vertical magnets attached to the compass, as hereinafter explained. And in order that my invention may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawings.

Fig. 1, shows so much of a compass (partly in section) as will enable me to describe the best means I am acquainted with for carrying out my invention. *a*, as an ordinary compass card and needle, N, S, supported at and turning on *b*, as is well understood. At the south end of the needle there is a standard having a vertical magnet, *x*, thereon, such standard, by sliding through a split and spring tube or otherwise, is made capable of being raised or depressed, so as to bring this magnet and hold it securely nearer to or further from the magnet, *n*, *s*, which is suspended by one of its ends, and moves freely on an axis fixed vertically over the axis of the compass needle; c^1, is an arm with a weight, c^2, thereon, to adjust the balance of this magnet, and it has a pointer, c^3, by which the deviation may be observed on the compass card. In the arrangement shown it will be seen that the magnet, *n*, *s*, is suspended by its south extremity, and its north extremity is over the south extremity of the

compass needle, N, S; and it will further be seen that the vertical magnet, *x*, is affixed by its south extremity to the south extremity of the compass needle, N, S, and that the north extremity of the vertical magnet, *x*, is brought near the north extremity of the magnet, *n*, *s*. In suspending the magnet, *n*, *s*, provision is made for its being raised from or brought towards the compass needle, and this is accomplished by means of the upright rectangular bar, *e*, which slides in a square socket fixed in the compass needle, in which the bar, *e*, is to be made capable of being fixed securely (when adjusted) by a screw or other convenient means. In the above arrangement the magnet, *n*, *s*, is suspended over the needle of the compass, which is the mode preferred; but this may be reversed, and the magnet, *n*, *s*, be suspended below the compass needle, N, S. And, although I prefer that the vertical magnet, *x*, should be fixed to the south extremity of the needle of the compass, and the needle, *d*, suspended by its south extremity, these are not essential, and may be reversed, and the details of construction may be otherwise varied, so long as the peculiar character of the invention is retained. And in order to prevent the effect of dip in the compass, I have found it desirable to apply a magnet or a piece of soft iron through or on the centre of the glass, in such manner as to have a tendency to lift the centre of the compass off its bearing point as shown at *f*. In this arrangement soft iron is used, as it is near a magnet, *n*, *s*; but in case the magnet, *n*, *s*, were below, then I should employ a magnet at *f*, and carry up a standard on the card of the compass with a piece of soft iron thereon, which coming near to the magnet, at *f*, above, would be attracted thereby, and tend to lift the compass off its bearing, and at the same time resist the tendency of the needle, N, S, of the compass to dip.

An instrument thus arranged or combined prior to its being placed on board ship is to be adjusted for this purpose; the compass is to be placed in centre of a room, or an open space free from the presence of iron. A bar magnet or plate or mass of iron is to be then placed, say about twelve feet from the compass, and either east or west thereof, and in the same plane, the effect of which will be to attract the compass needle, N, S, and repel, *n*, *s*, (or conversely,) the amount of these attractions or repulsions will be denoted on the rim of the compass card, by the pointer, *c*, and by the north or south point of the compass card,

making angles with the true magnetic meridian of the room or place previously ascertained. The requisite deviations of these needles are obtained by moving either *n*, *s*, up or down by sliding its bar, or by moving the vertical magnet, *x*, up or down. The instrument thus adjusted may then be placed in its proper position on board ship, and will similarly show deviations of the needles due to the presence of iron about it. Supposing the resulting effect of the ship's magnetism to be attractive of N, and repulsive of S, so as to cause N, S, to have an easterly deviation, the same attraction on *n*, would tend to give *n*, *s*, an easterly and the pointer, *c*, a westerly deviation, the deviation of the needle, N, S, will be checked and diminished considerably by the attraction of *n*, on S, modified by the repulsion of *n**; and in like manner, the deviation of *n*, *s*, will be checked by the attraction of S, on *n*, modified by *n*', as before. This state of things allows of a twofold opportunity of obtaining a true meridian. I can either so adjust *n**, *s**, that the tendency of *n*, *s*, to deviate may be wholly destroyed by the modified action of S, in which case the pointer, C, will give the true north point; or I may so adjust that the deviation of the needle, N, S, and magnet, *n*, *s*, shall be exactly equal, so that the line bisecting the angle between N, and C, shall be the true meridian.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is, the mode herein described of combining and constructing the parts of mariners' compasses.—In witness, &c.

JULIUS ROBERTS.

Enrolled February 23, 1853.

Specification of the Patent granted to OWEN WILLIAMS, *of Stratford, in the County of Essex, Engineer, for Improvements in preparing compositions to be used in railway and other structures in substitution of iron, wood, and stone.*—Sealed January 31, 1852.—Communication.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My improvements consist in making and adapting the com-

positions to be hereafter described for the permanent way of railways, for blocks of any size or shape for building purposes, for drains, sewers, cisterns, or any other purpose to which the same may be applicable.

To make a composition suitable for the permanent way of railways, sleepers, blocks for building purposes, drains, sewers, cisterns, and other structures, I take about 180 lbs. of pitch, 4½ gallons of dead oil or creosote, 15 lbs. of raw brimstone, 18 lbs of rosin, 45 lbs. of finely powdered lime, 108 lbs. of finely powdered gypsum, 27 cubic feet of sand, gravel, breeze, scoria, pieces of stone, brick, or other hard material, having been passed through a half-inch sieve.

The sulphur is melted in a proper boiler, with about 30 lbs. of pitch, then the rosin is added, and heated till the mixture boils, the remainder of the pitch is then added, and mixed, and boiled up, and then the lime and gypsum are introduced, little by little, and well mixed up, and brought to boil, then the sand, gravel, breeze, scoria, pieces of stone, brick, or other hard material, which must be perfectly dry, and have been previously heated, are to be added, and then the dead oil, the whole being constantly stirred up, well mixed, and worked together, till it is sufficiently heated; it is then thrown into moulds of any required shape, and well pressed in till the mould is properly filled, and, when cold, it is ready to be taken out of the moulds for use.

For pavements, floors, and like structures, I take about 10 lbs. of pitch, 1 quart of dead oil, 2 oz. of rosin, 5 lbs. of gypsum, 5 lbs. of lime, 4 lbs. of sulphur, ½ a cubic foot of sharp sand, ½ a cubic foot of gravel, about the size of peas, treated the same as mixture for sleepers, &c.

For joining or cementing pieces together, or as a mortar for cementing the blocks in building, 20 lbs. of tar, 2 quarts of dead oil, 1 lb. of tallow, 2 lbs. of sulphur, 20 lbs. of lime, 4 lbs. of rosin, boiled, and applied hot.

For covering roofs, bridges, viaducts, and other structures, 40 lbs. of tar, 4 quarts of dead oil, 4 lbs. of sulphur, 2 lbs. of rosin, 6 lbs. of tallow, 40 lbs. of lime, boiled, and treated the same as No. 1.

To adapt this composition to the permanent way of railways, I mould pieces (*a*) of convenient size for handling, say about 3 feet × 18 inches × 4 inches, and bring them side by side, longitudinally, in the blocks, as shown in the drawing. The transverse pieces (*b*) having holes cast in them,

for passing through them the holding-down bolts, and holes are made at x, to receive the transverse pieces, or slabs. The holes for the holding-down bolts are made when moulding the pieces, by the introduction of rods or cores of iron, of the required size. The composition is pressed into the moulds round the rods or cores of iron, which are afterwards drawn out, leaving the holes clear.

The ballast is pressed under and between the openings in the longitudinal and transverse pieces, as shown, and planks of wood (d) are laid on the surface of the ballast (e), and fastened down to the transverse pieces (b) by bolts and nuts, or other fastenings (e), so that the nuts, or other fastenings, may be slackened, and the rails raised or lowered, by adding to or taking from the ballast under the planks (d). The rails or chairs are fastened to the plank, in any convenient way. These longitudinal pieces, joined together with the cement, as above, form a continuous line of railway.

The surface of the permanent way between the longitudinal pieces, which are cemented together, and the rails, is covered with blocks of the same composition, about two inches thick, and of any convenient length and width, so as to prevent the water from penetrating from the surface to the ballast. Drains (g) are introduced for carrying away the surface water into the grips, or side drains, as shown.

The grips, or drains, are made of blocks, of convenient width and thickness, as shown; and the ramparting (h) of blocks, about three inches thick. I consider it necessary to keep the ballast from shifting by enclosing it, as shown, and as dry as possible, to prevent the moving or knocking about the permanent way, and thus ensure its durability.

I would remark, that I do not confine myself to the precise quantities of the materials above given, and some of them may be omitted, or others added; the peculiarity of this invention consists of the mode of employing such materials, and particularly the use of sulphur, combined with the matters above described, when making compositions for the purposes herein described.—In witness, &c.

OWEN WILLIAMS.

Enrolled July 31, 1852.

Specification of the Patent granted to HENRY NEEDHAM SCROPE SHRAPNEL, *of Gosport, for Improvements in Ordnance and Fire-arms, Cartridges and Ammunition, or Projectiles, and the mode of making up or preparing the same.*—Sealed August 23, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists, first, in the improvements, shown at fig. 2*, in the form of the bottom of the barrel, just where the base of an elongated or other ball is placed after being rammed home. As it is necessary that an elongated or other ball should expand larger than the bore of a piece, I have the part of the barrel where the base of the ball rests pared out in a conical form, so as to allow of ample expansion.

A, represents a section of a barrel; B, the ball; C, the chamber for the powder; a portion of the barrel, at *x*, *x*, is cut away, to about one-third the length of the ball, on the charge being fired the ball is expanded into the recesses, *x*, *x*, which, being larger than the bore, the ball is expanded and forced into the other part of the barrel and groovings, and has a much greater hold, preventing the least possible windage, and gives thereby additional velocity to the projectile.

My second improvement consists of an improved sight. This part of my invention consists of making the instrument called "the sight" of fire-arms, capable of folding in such manner as to be fixed, at times, at varied elevations, and according to scale.

Figure 1, is a plan of part of the barrel of a rifle, or other fire-arm.

Figure 2, is a side view thereof; and

Figure 3, shows another side view of the apparatus, constituting the adjustable or variable sight being shown in section. In each of these views the same letters are used, to indicate similar parts; *a*, is a plate, which is fixed, by soldering, or otherwise, to the barrel, *b*, as shown; *c*, is the folding part, which constitutes the "sight;" it moves on an axis at *d*, so that it may be folded down, or elevated, as is shown by red lines, or to any intermediate position; *e*, is a

link, which is connected, at one end, to the sight, *c*, and, at the other end, to the slide, *f*, which slides in the groove formed in the plate, *a*, and it slides somewhat tightly, in order that it may retain the sight in the desired position, so long as it is desired to do so; *g*, is a graduated plate, or surface; and, *h*, a pointer, fixed to the slide, *f;* by the use of this arrangement to fire-arms, an officer, judging of the distance of an enemy, or other mark, may direct the men to fix "the sight" in a suitable position for the distance, and thus ensure better aim.

My third improvement, shown at fig. 1*, is for using cylindro-spheric shot and shells, to which is attached a rod, *r*, *r*, *r*, *r*, of metal or wood, which rod passes right through the breech of the gun, by which means a three-pounder gun can drive a six-pounder shell, and the tail or rod attached thereto, preserves the shot or shell in its flight, so as to insure bursting, by percussion or concussion, when striking a ship, or other body.

My next, or fourth, improvement, shown by fig. 3*, relates to rifling ordnance and guns, by what I call the sphero-elliptic form, given to the piece by this method of rifling.

Figure 1*, is a section of a cylinder; *x*, *y*, *z*, are the cuts so deep as the rifling is intended, and the dotted lines the circle out of which the cuttings are effected, and the sweeps from and to the several ends of the cuts exhibit the form by which the form is graduated from one to the other, thereby changing the circle to three sphero-elliptic grooves.

I propose iron balls, shells, or bullets, to be made, having the appearance of the section, *x*, *y*, *z*.

The advantage to be gained by this method of rifling is to ensure a more general expansion of a bullet, and a better hold upon the rifling, and by adopting this form of shot, or shell, or ball, which is to ensure graduated shaped wings to the ball for strength, and equalizing the friction within the piece, which is not so in the old method of rifling.

My next, or fifth, improvement has, for its object, means of increasing range, and reducing windage. I attach a thick wad of any material, and a strong metal plate to the spherical ball, or projectile, of any other form, see drawing.

Figure 4, is a ball, with metal wire cast with it, as A.

Figure 5, is a ball, showing the wad, B, and the metal plate, D, through the centres of which the wire passes.

Figure 6, shows a ball, with the whole fixed together, ready for firing. The result of this arrangement is, that, on

the charge being fired, the force drives the metal plate, D, towards the ball, which compels the wad to expand, and the ball passes up the bore, or barrel, with a much greater velocity, owing to a considerable decrease in windage, or escape of the gas, thereby ensuring all the advantages herein described.

My next, or sixth, improvement, has, for its object, the mode of making-up the balls and cartridges; metallic wire, or cord, is cast with the ball.

The felt wadding, or wad, has a hole punched through its centre, as also the metal-plate, D. The ball, wad, B, and metal-plate, D, are all then connected by means of the wire or cord, A, and fastened or tied at the back of the metal-plate, D. The cartridges are made up by cartridge paper or pasteboard, or other material, being secured to the wad, choked at *s*, *s*, figure 7, having the appearance, *x*, *x*; the wad being less than the bore of the piece, or gun, to ensure facility in loading; the charge is then put into the cartridge, *x*, *x*, and secured by paper, or a hard top, to be removed by the fingers, or teeth, prior to loading.

My next method is, having a strong case of tin, paper, or other substance, made like the bottom of a pill-box, *p*, *p*; the charge of powder is first put in, afterwards the ball, B, is put in and secured, having the appearance of, *c*, and secured, by paper pasted round the case and ball. In loading, the man secures the ball in his teeth, and draws the case away, shakes the powder down the barrel, and places the ball in the muzzle, ready for ramming down.—In witness, &c.

HENRY NEEDHAM SCROPE SHRAPNEL.

Enrolled February 23, 1853.

Specification of the Patent granted to JOHN MICHELL, *of Calenich, Cornwall, for Improvements in Purifying Tin Ores, and separating Ores of Tin from other Minerals.* —Sealed September 18, 1852.

To all to whom these presents shall come, &c., &c.—My invention consists in the application of common salt for purifying tin ores, and separating ores of tin from other minerals. And in order that my invention may be most

fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

I first test samples of the ore containing tin, in order to ascertain what quantity of common salt will be required for the particular ore about to be treated, according to my invention, and for this purpose I take two samples (of stamped and washed ore) of eight ounces each, and with one of these I mix one ounce of common salt, and with the other I mix two ounces of common salt. These two samples I put into separate crucibles and expose them to a heat of about 163 degrees of Daniell's pyrometer, during about three quarters of an hour, and throw them into water, and if on analyzing the oxide of tin it is found to be pure where the one ounce has been used, I know that that proportion will do for the whole, but if the oxide of tin is not pure and the oxide of tin in the other quantity is found to be fully sufficient, then either two or less than two ounces will be sufficient. If I think that less will do I try a third sample with less, or I try three or more samples in the first instance, but a workman after some practice with care and observation will soon be able to judge of the quantity of common salt required, and in some cases he will be able to do so even without testing samples of the ores, as above explained; an excess of common salt renders the mass inconvenient to stir and separate.

Having determined the quantity of salt to be used, I mix with the ore, previously stamped and washed, the proper proportion of common salt, and I then subject the mixture to heat in a reverberatory or other furnace, taking care that the temperature is as nearly as may be about 163° of Daniell's pyrometer, because at that heat the oxide of tin will not be acted on by the salt, which is important, as my object is not to decompose the oxide of tin, but to separate the other metals or minerals mixed with the tin ore by rendering them when united with the chlorine of the salt soluble in water. And this temperature is to be raised gradually and maintained for about three or four hours, keeping the mixture stirred from time to time. The mixture is to be thrown into water and well washed, and the tin ore is to be then smelted in the ordinary manner. The ores containing tin differ very largely, and some may be treated with acid only, as described in the specification of a former patent granted to me; other ores will more readily yield to the process above described, which

is readily ascertained by the means of testing above described, and some ores not acted on fully by the acid process formerly described by me, or by this process, may, after being treated by the acid process, be treated with advantage by the process above described. I would remark that I am aware that ores of tin have before been mixed with common salt and subjected to a higher degree of heat in order to render the oxide of tin soluble in the manufacture of the stannate of soda. I do not, therefore, claim generally to mix ores of tin with common salt and apply heat thereto.

But what I claim is,

The mode herein described of applying common salt for purifying tin ores, and separating ores of tin from other minerals.—In witness, &c.

JOHN MICHELL.

Enrolled March 18, 1853.

Specification of the Patent granted to GEORGE HUTCHISON, *of Glasgow, in the Shire of Lanark, Merchant, for a Method of Preparing Oils for Lubricating and Burning.* —Sealed September 18, 1852.

To all to whom these presents shall come, &c., &c.— My invention consists in imparting to common or inferior oils a greater degree of fluidity than they possess naturally, by mixing with them such proportional quantities of an oily ether as are or may be found sufficient to produce in them the degrees of fluidity most suitable for the purposes of lubrication and burning.

It is well known that oily substances used as lubricants diminish the friction of rubbing surfaces, by preventing contact of those surfaces, and by transferring the abrading action which the two metals would otherwise exert on each other to the matter of the lubricant. The lubricant must, therefore, possess a certain degree of unctuosity or "body," in order that a film of it may remain always interposed between the solid surfaces, and may not be extended by the pressure upon them; and consistently with that condition, the more the internal mobility of its particles among themselves is increased, the better is the lubricant adapted to the purpose it is designed to serve; for the less its viscidity is

the less resistance does it offer to the moving force, and so much the smaller fraction of the motive power is expended in overcoming the friction of the rubbing parts of the machinery. It is because sperm oil possesses these qualities in a higher degree than other oils, that it is superior to them as a lubricant; for while it is equally stable it is more fluid than other oils, which is on account of its containing more hydrogen in proportion, and a less highly oxidized base. In order, therefore, to impart to common oils a degree of fluidity equal or superior to that of sperm-oil, which is especially the object of my invention, it is necessary and sufficient to mix with them some portions of an oleate possessing a still higher degree of fluidity than even the oleate of Cetyle; and the oleates of the oxides of ethyle, methyle, and of the bases of the other alcohols, possess this quality of greater fluidity. In carrying my invention into effect I, therefore, employ the oleates of those bases, prepared in the way to be hereafter described, for mixing with the common or inferior oils, in such proportions as may be suitable. I do not confine myself to any particular proportions, for these proportions are found to vary according to the degree of viscidity of the particular kind or quality of oil operated upon; but that my invention may be fully understood, I here state, by way of illustration, that I find the addition of one part of oleate of oxide of ethyle is sufficient to communicate to two parts of neutral tallow-oil, lard-oil, and oils of like natural viscidity, such a degree of fluidity as renders them equal as lubricants to the best sperm-oil.

It is also known that, for the purpose of artificial illumination, sperm-oil is superior to other fixed oils, chiefly on account of its greater fluidity, in consequence of which it flows more freely in the lamp-wicks through which it is burned, than the more viscid oils; and for that reason, and in order to improve those oils for burning by imparting to them the quality of fluids, so desirable and on which the superior value of sperm-oil in great part depends, I mix them as before described, with suitable quantities of an oily ether, in the same way as in preparing them for the purpose of lubrication.

That my invention may be wholly understood, I will now describe the method by which I prepare oleic ether for the purpose of mixing with common or inferior oils as aforesaid.

I adopt the proportions of materials recommended in treatises on scientific chemistry; that is to say, I digest, by boiling in a suitable vessel or "still," and over a fire of moderate intensity, a mixture composed of one part by measure of sulphuric acid, eight parts of alcohol, and four parts of oleic acid, until the union of the base of the alcohol with the oily acid is complete. The time necessary to effect this digestion depends on several circumstances, as the activity of the fire, size, and construction of the apparatus employed, and the strength of the materials composing the mixture; but, supposing that the still or digestor employed is capable of containing about sixty gällons, and that the materials used are of the ordinary commercial strength, with a moderate fire, which is always preferable as well for convenience as economy, the process will generally occupy about five hours for the first charges at the commencement of the cycle of operations, according to which the experification is practically conducted, and latterly about twelve hours. At the end of each operation, or "bout," I replenish the residuary liquor with about an eighth part of the original charge of alcohol, and about a fourth or fifth part of the original quantity of sulphuric acid. I do this for the purpose of maintaining the etherifying power of the mixture, which is gradually reduced by the appropriation of the constituent and mixed water of the alcohol, converted into ether and the basic water of the oleic acid. The liquor, after being thus "refreshed," is again digested with a new quantity of oleic acid, equal to the first charge, and the boiling is again proceeded with, and continued until the union is complete as before. The process is to be thus continually repeated, by adding always fresh alcohol and sulphuric acid at each charge, and digesting anew, till the alcoholic liquor in the digestor has become so much weakened by the continual accumulation of water as to be incapable of etherification; that is to say, until the quantity of the water has so much accumulated as to have an atomic relation to the sulphuric acid of four atoms of water to one atom of acid; and this I find usually to happen after about seven charges have been worked off, with alcohol and acid of the ordinary commercial strength. The kind of apparatus which I prefer consists of a leaden still or digestor, approaching to a spherical shape, over which I place a condensing worm for the purpose that the

alcoholic and ethereal vapours may be condensed therein, and returned in a liquid state to the still, and so continue the operation.

To purify the oleic ether after it is taken from the digestor, and render it thoroughly neutral and fit for being mixed with oils intended to be employed in lubrication, I treat it with an alkaline solution, and afterwards wash it with water and filter it. The oleate thus prepared is to be mixed with common oils in such proportions as will impart to them the degree of fluidity desired.

Having now described the nature of my invention, and the manner of carrying it into effect, I would have it understood that I do not confine myself to any particular form or kind of digestor, or proportions of the materials used in preparing the oleates, nor in mixing them with the oils to be improved.

But what I do claim is,

First, the mixing of common or inferior oils with an oily ether, for the purpose of imparting to them greater fluidity, or of rendering them less viscid.

Secondly, the application of a worm or condenser to the digestor employed in making oleic ethers, whereby the alcoholic and ethereal vapours are condensed and continually returned to the digestor.

Thirdly, the maintaining of the etherifying power of the alcoholic liquor in the process of making oleic ethers, by continued additions of sulphuric acid, causing thereby the proportion of acid continually to increase as it becomes more diluted by the accumulation of water from the alcohol converted into ether.—In witness, &c.,

GEORGE HUTCHISON.

Enrolled March 14, 1853.

Specification of the Patent granted to JOHN *and* EDWARD LAWSON, *both of Leeds, Machine-makers, for Improvements in Machinery for Scutching and Cleaning-Flax-Straw.*—Sealed September 23, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—Our invention consists of combining machinery in such

metal, and, consequently, the other metals, contained in such ores, from the copper, and, in order that my invention may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me. I cause the ore to be calcined, and then reduced to powder, and I employ an apparatus, consisting of a tub or vessel, which I prefer to be of wood, or earthenware; at the bottom of this vessel, I apply a frame of strong platinum wire, of the dimensions of the interior of the vessel, the frame has formed on it reticulate platinum wire-work, or netting, with meshes of about an inch each way. This frame and netting is lowered down on, and covers the ore placed on the bottom of the vessel, a platinum wire is connected to the frame, and also with the positive pole of a battery, which I prefer to be of the description known as Daniel's battery. The connecting platinum wire is coated with gutta percha, when working with cold liquid and with other non-conductor, when the liquid is heated, from the point where it is connected with the frame up to a point above the vessel, so that the fluid therein may not come in contact with the wire. The battery which I have employed when acting with a vessel containing about 250 to 300 quarts of diluted acid, as hereafter explained, consists of twenty pairs of plates, each in a gallon glass vessel, which I fill with a saturated solution of sulphate of copper, and add one-twentieth to one-tenth of sulphuric acid. To the negative pole of the battery I affix a copper wire, and to the other end of such wire I (by three or more smaller ones) suspend a basin of wood, which is lined on the inside with sheet copper, and I cover this lining with a cover of copper-wire netting, which consists of about one-inch meshes, the copper lining in contact with the suspending wires. Into the vessel I put about 230 to 235 quarts of diluted sulphuric acid, using about five quarts of sulphuric acid of commerce to 230 quarts of water; into this liquid I introduce about 15 lbs. of the powder of calcined ore, stirring the fluid as the powder descends.

I have found it desirable that the ores should remain in the dilute acid some three or four days before subjecting the same to electric currents, stirring from time to time, after which and immediately after stirring I introduce the frame of platinum wire; and then the battery being charged the process of separating the copper will immediately go on, and the copper will be received into the basin in the form of a powder; the process of separating all the copper

requires some days, and I have not found that the acid solution has required to be added to during the process; the other metals separated from the copper will be in the sediment at the bottom of the vessel, and when the process is completed or judged to be completed, the liquid is run off with the remaining or sediment matter at the bottom of the vessel, and the vessel is again to be charged. If on testing the deposited matters after they have been run off and allowed to subside they indicate a material quantity of copper, when I again calcine and add them to calcined ores, or a quantity of the subsided matters in the vessel may, before being run off from the bottom of the vessel, be tested to ascertain whether it is desirable to carry on the process further thereon. The dilute acid run off from the subsided matters may be used again. I have found it desirable to heat the liquid during the process as much as conveniently may be done, even up to boiling, and this I have done when using earthenware vessels by means of a sand bath.

Description of the Drawing.

Fig. 1, is an arrangement of apparatus such as I have used, but the same may be varied; *a*, is a vessel of wood capable of containing about a hogshead of liquid; *b*, is a frame of platinum wire shown in plan at fig. 2; *c*, is a plug in an opening for running off the sediment and liquid from the bottom of the vessel; *d*, is a basin of wood lined with copper, this basin is covered with copper wire netting, not extending over the edge of the basin, and suspended by a copper wire, *e*, which is in connexion with the negative pole of the battery and with the copper lining of the basin; the wire and basin are supported at *f*, by means of a cord or band of gutta percha as shown; *g*, is the powder of the ore under process covering the bottom of the vessel.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that I do not confine myself to the details herein described and shown, so long as the peculiar character of the invention is otherwise retained, and I would state that although I have mentioned and believe that sulphuric acid is the most convenient for the purpose of carrying out my invention, I do not confine myself thereto.

But what I claim as my invention is the mode herein

described of employing currents of electricity for separating metals from their ores.—In witness, &c.,

ANDREW CROSSE.

Enrolled February 26, 1853.

Specification of the Patent granted in Scotland to FREDERICK WILLIAM MOWBRAY, *of the Borough of Leicester, Gentleman, for Improvements in Machinery for Weaving.*— Sealed October 21, 1851.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— My invention consists,

First, of improvements in the apparatus used when weaving piled fabrics, by what is called cross weaving. And I would, at the outset, state that I am aware that the use of cross weaving for making terry and cut pile fabrics has before been proposed, and means have been suggested for employing such class of weaving for making terry and cut pile fabrics. I do not, therefore, claim the same, my invention consisting in the application of certain arrangements of apparatus hereafter described for weaving such description of fabrics.

Description of the Drawings, A.

Fig. 1, shows a front view; and

Fig. 2, a transverse section of so much of an ordinary power-loom, together with apparatus according to my invention, as will enable me to describe the nature of my improvements. The loom is arranged, if worked without my invention, to produce plain tabby weavings by a single warp; but this may be varied, and looms having my improvements applied thereto may be arranged to produce other classes of weavings. It will not be necessary to describe the nature of the parts of the power-loom shown, further than is necessary to point out the working of the apparatus applied thereto according to my invention; neither will it be necessary to describe the nature and mode of working of the parts of ordinary power-looms not shown in the drawings, as the same will be applied and caused to work as heretofore, and as is well understood; and a chief peculiarity of my invention consists of applying a series of

guides to carry those warp-threads which are to produce the terry or cut-pile on the face of the fabric, which is otherwise produced by the loom to which my improvements are applied. And these guides are caused so to work the warp-threads which they carry that they cross them over wires, which, though not new in themselves, are improved in their action by moving on an axis, and by being combined with a comb or reed through which the ordinary warp-threads pass; *a*, *a*, are a series of guides which are set in leads, a^1, affixed to the bar, *b*, which has necks, b^1, formed at its ends, by which it is supported in the upper ends of the rods, *c*; the lower ends of these rods are carried by the ends of the levers, *d*, one on each side of the loom. These levers, *d*, turn upon pins, d^1, projecting from the framing, as shown; and they have trucks or rollers, d^2, which run upon the cams, d^3, affixed on the shaft, *e*, by which arrangement the bar, *b*, will have an up and down motion given to it, in order to the guides, *a*, taking the pile warp-threads down below the shed to be tied in by the weft, and again raised to produce the crossings for the next row of pile. And in order that the pile threads passing through the guides, *a*, may lay their threads successively on one side and then on the other side of the wires, *f*, to produce the crossing; the bar, *b*, has a sideway movement given to it alternately to the right and then to the left, on the ascent of the guides above the ordinary warp-threads. These movements are accomplished by means of the levers, *g*, *g*, which turn upon pins, g^1, carried by the rods, *c*. At the upper ends these levers have screw pins, which press against the ends of the bars, *b*; and at their lower ends they have nibs which rest against the peripheries of the wheels, g^3, which are to be so cut as to give the required sideway movement for the crossing. These wheels, g^3, are affixed to axes carried by the bars, *c*, which axes carry ratchet wheels, g^4, which, during each upward movement of the bar, *b*, come in contact with the drivers, g^5, by which the wheels, g^3, will be moved one space, and the bar, *b*, and the guides will be shogged thereby; *h*, *h*, are connecting-rods, one on each side of the loom, each of which is connected at one end to standards projecting up from the side of the loom, and at the other end to the upright rods, *c*, so as to control the rods, *c*, and consequently the bar, *b*, to move in a vertical plane or nearly so. The bars, *c*, are also guided in their movements by the guides, c^1; projecting from the side of the

framing, b^2, are steadying plates affixed to the bar, *b*, and resting in forked pieces; projecting from the inside of the bars, *c*, to prevent the bar, *b*, turning on its necks, *i*, are combs or guides through which the ordinary warp-threads pass, in order to those warps being more regularly spaced, thus facilitating the entrance of the guides, *a*, with their pile threads between the warp-threads. The combs or guides, *i*, are also the means of sustaining one end of each of the wires, *f*, whilst the other end of each of such wires is in the work produced or resting on the breast beam. The combs or guides, *i*, are affixed to the bar, *j*, which is supported at each end by the arms, j^1, being connected to the levers, j^2, which are actuated so as to give the bar, *j*, a rising and falling motion by means of the cams, j^3, also affixed on the axis, *e*.

The object of this movement of the bar, *b*, is to save as much as possible the time of movement of the bar, *b*, by lowering that end of each of the wires, *f*, just when the shed is closed for the change, (as shown by fig. 13,) and whilst the sideway movement is being given to the bar, *b*; this I consider an important feature of my invention. The cam-shaft, *e*, receives motion in the ordinary manner from the crank-shaft, *k*, by means of the toothed-wheel, k^1, on that shaft taking into the toothed-wheel, e^1, on the shaft, *e*; upon the shaft, *k*, is affixed the ordinary fast pulley, by which it receives motion by a band from a steam-engine or other suitable power.

When it is required to produce cut-pile fabric I employ cutters, such as shown at *l*. They consist of discs or circular plates of steel, with knife-edges, which are fixed, as shown on the shaft, l^1, and by being caused to rotate in the open ends of the wires, *f*, cut the loops of the pile as the fabric comes up to those knives.

The shaft, l^1, has motion given to it from the shaft, *k*, by means of a gut or band, l^2, passing partly round the pulley, l^3, on that shaft giving motion to the pulley, l^4, which turns freely upon a stud or pin projecting from the framing, and which has affixed to or formed with it, another pulley-wheel, l^5, which by means of the gut or band, l^6, gives motion to the pulley, l^7, affixed on the shaft, l^1.

Fig. 3, shows a portion of a front view; and

Fig. 4, an end view of some of the parts separately, in order to their construction and mode of working being more clearly understood.

Fig. 5, shows a front view of some of the circular knives on their spindle, showing how they are kept at the required distance from each other by washers, l^8.

Fig. 6, is a side view of the same.

Figs. 7 and 8, show a side view and an edge view of one of such circular knives.

Figs. 9 and 10, show a face and edge view of a lead of guides or instruments, *a*.

Figs. 11 and 12, show a face view and an edge view of a lead of combs, *i*.

Fig. 14, shows a section of portion of a loom, with a modification of my improvements applied. In this case I have shown two sets of guides or instruments, *a*, for laying in the pile-threads, by which arrangement I am enabled with great facility to obtain a more dense pile to the fabric. In this arrangement I prefer that each bar should have for the time being its sideway movement given to it, in the opposite direction to that which the other bar of the time being is receiving, by which a crossing of the loops produced by the working of the separate bars of instruments will be effected; I have principally shown this arrangement for carrying out my invention, as producing terry or uncut-pile, but if it be required to produce cut-pile, then an arrangement of cutters, such as I have described, will be employed.

Fig. 15, shows a section of part of a loom, with another modification of my invention applied. In this case the individual guides or instruments, *a*, are capable of being separately acted upon by means of jacquard or other pattern surface; I have not thought it necessary to show any arrangement of jacquard or pattern surface, such apparatus being well understood and readily applied by any intelligent workman, acquainted with the working of looms.

Fig. 16, shows a portion of a front view; and

Fig. 17, an end view of some of the parts by which the variations necessary in carrying out this modification may be readily understood.

The guides or instruments, *a*, are capable of sliding freely in combs, a^1, a^1, carried by the bar, *b*, which is worked in like manner to that bar in the previous arrangements.

The mode of working by means of a jacquard or other pattern surface is particularly applicable for making terry or cut-pile surface in pattern, and by the arrangement

shown, the jacquard or other pattern surface employed will select and raise out of the way those guides, *a*, which are not for the time being to act, to produce pile on the fabric, whilst those which remain down will be those which will be acting to produce pile on the parts of the surface of the fabric. The guides or instruments, *a*, when the selection has taken place, will be held in their positions by means of the locker, *m*, turning into one of the two recesses, a^2, in each guide, *a*, the locker, *m*, is carried (so as to turn in bearings, m^1,) by the bar, *b*, and it has motion given to it by the cam, m^2, upon the cam-shaft, *e*, such cam acting upon the lever, m^3, which by means of the rod, m^4, acts to turn partly round the toothed-wheel, m^5, which takes into and gives motion to the pinion, m^6, affixed on the shaft, *m*. The guides or instruments, *a*, are all caused to descend to their correct position as the bar, *b*, ascends, by means of the loose bar, *n*, resting on the top of the guides or instruments, *a*, and so soon as the locker, *m*, releases them, the bar, *n*, *n*, causes them all to descend to their lowest position.

Another part of my invention relates to various improvements in the arrangement and construction of looms for weaving. These improvements are for the most part shown applied to a loom for producing two fabrics therein at one time, and of the character of cut-pile, the pile being formed from certain extra warp-threads, provided for the purpose; and the pile having been produced between the two bodies or backs, it is cut by a suitable cutter during the working of the loom. But as it has heretofore been proposed to adopt similar means to those I have shown for keeping the two bodies distended, and thereby regulate the length of pile produced, as also to cut the pile, and thereby obtain the two fabrics, I do not make any claim thereto, but only to other means, which I will now describe, by which such description of fabrics, as also other fabrics, may be more effectually produced.

Description of the Drawings, B.

Fig. 1, shows a front view.

Fig. 2, a section.

Fig. 3, an end view; and

Fig. 4, a plan of parts of a loom with my improvements applied.

Figs. 5, 6, 7, 8, 9, 10, and 11, show various views of a rotatory-shuttle box, and parts connected therewith.

Figs. 12, 13, 14, 15, and 16, show other details separately. *a*, *a*, is the framing of the loom; *b*, is the crank-shaft which receives motion from a steam-engine or other suitable power by means of a band acting upon the drum, b^1, fixed upon that shaft or axis; upon the shaft or axis, *b*, is fixed the tooth-wheel, b^2, which takes into and drives the tooth-wheel, *c*, fixed upon the cam-shaft, c^1; *d*, is the warp-beam upon which are wound the warps, d^1, to be used in producing the backs or bodies of the fabrics. These warps, d^1, are governed to produce the sheds by passing through eyes caused by the healds, d^2, d^2, which are actuated for this purpose by suitable pattern surface, as is well understood; *e*, *e*, are rollers or beams upon which are wound the warps, e^1, which go to produce the pile of the fabrics. These pile-warps, e^1, are governed in their movements by being passed through eyes caused by the healds, e^2, and they are guided to the healds so as to avoid as much as possible friction upon those threads in the working of the healds by means of the rollers, e^3; *f*, are the instruments, which together with the bar, *g*, (which extends across the loom, as shown,) go to regulate the distance between the two backs, and consequently the length of loop. The instruments, *f*, are each at one end held in combs, f^1, set in leads, as shown, there being wires, which passing through those combs and through the ends of the instruments, *f*, retain them as by a hinge-joint. The combs are secured to the bar, f^2, which is carried upon the upper ends of the arms, f^3, which turn upon centres, f^4, carried by the framing, and at their lower ends are by means of pin-joints, connected to the rods, f^5, by which a slight forward movement is given to the instruments, *f*, at the time the heat up takes place to prevent the reed striking those instruments, by which either or both might be injured. The rods, f^5, are supported, so as to slide freely in eyes, f^6, at the back of the loom, and the required to-and-fro motion is given to them by means of the rise f^7, on the ring, f^8, affixed on the crank shaft, acting upon the rollers, f^9, carried by the rods, f^5. The cutting of the pile-warp after it has been well bound in by the weft, to produce the separate fabrics, is obtained by the cutting edge affixed to the cutter-bar, *h*, which is supported between the flanges formed on the supporting rollers, h^1, h^1, caused by the

framing of the loom, and it has a reciprocating movement given to it from side to side of the loom by means of the eccentric, h^2, upon the upper end of the shaft or axis, h^3, which is driven from the shaft, c^1, there being affixed upon that shaft, c^1, a bevelled pinion, h^4, which takes into and drives the bevelled pinion, h^5, upon the shaft or axis, h^6, upon which is fixed the bevelled pinion, h^7, which takes into and drives the bevelled pinion, h^8, affixed upon the shaft or axis, h^3. The two fabrics having been separated by the knife edge, *h*, are conducted over the rollers, *i*, *i*, to the work-beams, *k*, *k*; *l*, *l*, is the framing of the batten, which is worked in the ordinary manner, but the shuttle-boxes are formed to rotate upon centres caused by the framing of the batten, and it is a mode of constructing and giving motion to such series of shuttle-boxes, which constitutes one important feature of my improvement. I have not shown the shuttles in the boxes, which separately are similar to ordinary shuttle-boxes, except that the one side of each is continued higher with a flange to prevent the shuttle falling out as the series of boxes rotate; *m*, *m*, are the different shuttle-boxes of the series which are each affixed to an axis, m^1, by which they are caused to rotate as hereafter described; these axes are supported in the bearings, l^1, caused by the framing of the batten; m^2, are the flanges by which the shuttles are prevented falling out as the series rotate; m^3, are the swells for acting upon the stopping apparatus when the shuttle is not received into its box; these swells, m^3, turn upon axes, m^4, and at their other ends have projections, m^5, which as the series of boxes rotate come successively against the hanging lever, m^6, suspended from the pin, m^7; when the shuttle is correctly received into the box the swell is forced outwards by which the projecting part, m^5 will be caused to force outwards the hanging-lever, m^6, the lower end of which will then act upon the arm, m^8, of the stop-rod, and prevent the arm, m^9, acting to stop the loom. In the event of the shuttle failing to be received into one or other of the shuttle-boxes, for the time being in a line with the race, the swells will not be acted upon, and neither of the hanging-levers, m^6, being moved outwards to act upon one of the arms, m^8, the arms, m^9, will act upon suitable apparatus, as is well understood, to throw the strap off the fast on to the loose drum, by which the loom will be stopped. Motion is communicated to the shuttle-boxes to

cause them to rotate when required, in the following manner: upon the shaft, m^1, of each of the series of revolving-shuttle boxes are fixed the ratchet-wheels, m^{10}, which are capable of being acted upon by the drivers, m^{11}, m^{12}, which are caused by pin-joints from the upper ends of the arms, m^{13}, affixed to the shafts, m^{14}, which are carried by supports from the framing of the batten, so as to move with it, and they have other arms, m^{15}, which by riding against the trucks, m^{16}, in the forward movement of the batten move the arms, m^{13}, inwards, by which, when either of the drivers, m^{11}, m^{12}, is allowed to descend, it will by acting on its ratchet-wheel, m^{10}, move the series of shuttle-boxes partly round, so as to bring up the next succeeding shuttle-box; *n, n*, are the threads from the jacquard apparatus employed, by which the selection of driver, m^{11} or m^{12}, which is next to act, takes place. One of the jacquard threads is attached to the arm projecting from the driver, m^{11}, the other is attached to a pin, 1, projecting from the plate, 2, attached to and forming a prolongation of the driver, m^{12}. As the parts are shown in fig. 3, the driver, m^{11}, is in position to act upon its ratchet-wheel at the next coming forward of the batten, and the driver, m^{12}, is raised out of action, and during such coming forward of the batten it will remain out of action by its plate, 2, riding on the pin, 3, carried by the driver, m^{11}.

In fig. 16, I have shown the driver, m^{12}, in position to act upon its ratchet-wheel by the coming forward of the batten to drive the series of shuttle-boxes in the opposite direction, and in this case it will be seen that the pin, 3, of the driver, m^{11}, is resting upon the top of the plate, 2, but unless prevented (by the selection of the jacquard just when the batten comes fully into the front) the pin, 3, will slide down the incline, 4, at the back of the plate, 2, and permit the driver, m^{11}, to act the next time; m^{17}, is a squaring-bar, which, by the spring, m^{18}, acts against the plate, m^{19}, to square the boxes. There is a small space, *z*, left between the inner ends of the series of shuttle-boxes, and the plates, *y*, carried by the batten to admit of the passing of the weft-threads held in the fabrics, whilst the shuttle-boxes rotate with the shuttles. The picker, *o*, when it is brought back from throwing the shuttle, rests in the recess on the upper side of the bearing, l^1, and to prevent this re-bounding, and resting in the shuttle-box, which, for the time being, is in a line with the race, there are applied the light springs, *p*,

which are carried by and move with the picker-arms, and are connected by cords, p^1, to their respective pickers with a tendency to keep them free of the shuttle-boxes, as the shuttle-boxes revolve. In working the loom with this or other arrangements of shifting shuttle-boxes, it is necessary to repeat the picking from the same side of the loom by a shifting of the boxes, *f*, having taken place, and the fresh shuttle being brought up from the side last picked. In order to do this and to enable me to pick in any order, and from either side, as desired, I cause the selection of pickers to be by jacquard apparatus, which I accomplish in the following manner:—The picker-arm, *q*, is affixed to the axis, q^1, upon which is affixed the short-weighted arm, q^2, which, by means of the letter, q^3, is connected to the lever, q^4, which turns upon the axis, q^5, and carries the truck, q^6, which is acted upon by the tappet-cam, q^7, all which is similar to what is commonly in use, but in place of the truck or roller, q^6, being a fixture, as is ordinarily the case, I form its axis, capable of being raised, by means of jacquard cords into the position indicated by dotted lines, in which position of the truck the tappet-cane will pass without acting upon the picker-stick.

In working to produce double fabric with pile surface, such as shown, the shed will be alternately opened for the one back, and then for the other, and no one shuttle will work to throw in weft first with one and then with the other back, but each weft will always keep working with its own particular back or body.

Fig. 17, shows a part of the front view of a batten; and

Fig. 18, a section of the same, showing a mode of relaxing the reed when the shuttle sticks in the shed; A, is an arm offered to the stop-rod, which, when the shuttle is thrown in raises pins, B, which support the bar, C, against the lower part of the reed when the shuttle sticks in the shed, and the stop-motion is thereby brought into action, the bar, C, is allowed to fall, and the reed is at liberty to turn upon its axis, D.

Another part of my invention relates to a mode of applying parts in connexion with jacquard apparatus, working with a loom, so as to obtain repetitions of certain of a set of cards where required.

One object I have in view is to introduce portions of plain fabric between varied figured patterns, by means of two plain fabric cards only, and I will suppose it is desired

to weave a dress having five or six rows of figures round it, commencing at the bottom of the dress with a large heavy pattern, then say two inches of plain, then another lighter pattern one and a half inches of plain again, and so on to the end of the fifth or sixth row of figuring, whichever the case may be; the length of the dress (forty-two inches or about) will then be nearly half made, the remainder of the length to the waist (say twenty-five inches) it is required to be plain. By the old method it was customary for the weaver to take off the figuring cards when he had wove them over once and put on plain cards, then take the plain ones off, and place the next figure set on, then the plain again, and so on alternately. But by this part of the invention two plain fabric cards are put in between each figuring lot of cards; and when the plain cards come on to the cylinder I alternate upon these two plain fabric cards, so as to make any length of plain fabric.

Description of Drawing, C.

Fig. 1, shows a side view; and

Fig. 2, a back view of parts of a jacquard apparatus with my improvements applied. A, is a cam wheel divided into six parts, having six pins, B, rivetted into its side upon which the lever, C, is caused to act by the rising and falling of the grip of the jacquard when the lever, D, is in the position shown, and to miss the pins when in the position indicated by the dotted lines, the action of the lever, C, causes the cam, A, to revolve, raising and lowering the small lever, E, alternately, which acts simultaneously on the lower clawker, F, of the jacquard, raising it into contact with the cylinder, at the same time pushing the clawker, G, out of action by means of the pin, G^1. The lever, D, is connected with a lever, H, fixed on the comber board by means of two wires, J^1, J^2, or other suitable material; and lever, H, is also connected with the jacquard by means of two similar wires, K^1, K^{11}, attached to two of the wires in the jacquard, and capable of being connected with the hooks, L^3, L^{11}.

When the jacquard is weaving the rows of figures, the lever, D, is in the position indicated by dotted lines and the wheel or cam, A, as shown with the upper ratchet of the jacquard acting and the wire K^1, is hooked on to the hook, L^1, consequently whilst the weaving of the figure part takes place, the cam, A, is at rest, because the lever C, is as shown by dotted lines, but when the cylinder

presents the first of the two plain fabric cards for the selection the grip takes up one of the wires, the card being cut for that purpose, connected with the wire, K^1, and hook, L^1, lifting the lever, H, so as to pull the lever, D, into the position as shown, and when the grip descends the lever, C, racks the cam, A, one notch, bringing the lower ratchet, F, into action and throwing the ratchet G, out, the next time the grip descends it racks another notch, causing the lower ratchet, F, to go out, and the upper ratchet, G, into action, and so on alternately at the pleasure of the weaver. When it is desirable to commence on the figuring cards again the weaver takes off the wire K^1, from the hook L^1, and puts the wire, K^{11}, on the hook, L^{11}, and when the first card of the two plain fabric cards selects it will on the rise of the grip pull down the lever, D, into the position indicated by the dotted lines, and cause the lever, C, to go out of action, leaving the lever, E, on one of the rises of the cam as when it started. I would remark that one wire is sufficient to effect this change if alternately placed on the different hooks, but this arrangement of the two wires are preferred because it enables the weaver to change the cam, A, for one cut differently, as shown at fig. 3, drawing C, to weave other descriptions of goods not so conveniently done by the one wire, and I will suppose it desirable to figure the upper part of a dress which according to the arrangement just described was woven plain without figure by means of spots or other figures.

I then use a cam with six divisions, the same as before, but having three rises on one-half of its circumference, and three falls on the other half together, as shown at fig. 3, drawing C, instead of alternate rises and falls as before, and I use four cards for the plain fabric cards between the figuring cards, instead of two cards; then after the last row of figuring is woven, there are, say, sixty cards cut with a spot or other figure capable of being reversed; when by a hole in the second, for one wire, in the third, for the other, and in the fifty-eighth, the same as in No. 3, and in the fifty-ninth, the same as No. 2, of the sixty cards the same operation can be carried on, as described in relation to the two cards or the four cards, the only difference for the weaver is, that when in the last row of figuring before coming to the "spotted plain work," the wires are to be taken off both the hooks, but when past the fourth or fifth of the sixty cards, the wire, K^1, is to be put on the

hook, L^1, and the wire, K^{11}, on to the hook, L^{11}, then when the fifty-ninth card selects, it will put into operation the rachet, F, by means of the cam falling into the first fall, and reverse the action of the cylinder so that the cards will work from No. 60 towards No. 1, and when the No. 2 card selects, it will bring into operation the ratchet, G, causing the cylinder to go back as before from No. 1 to No. 60, and so on alternately at the discretion of the weaver. When it is desirable to commence the rows of figuring again, the weaver has merely to remove the wire, K^1, from the hook, L^1, somewhere between the fourth and fifty-seventh card, when the ratchet, G, is acting, and the cylinder will continue to revolve by the ratchet, G, as usual.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood, that I do not confine myself to the details as herein shown and described, so long as any of the peculiarities of my invention be retained. But what I claim is, first, the manufacture of terry and cut-pile fabrics, by employing suitable guides, or instruments, and apparatus combined therewith to control the movement of the pile threads when producing pile fabrics by cross-weaving.

I also claim the giving to the wires or instruments used when producing terry and cut-pile fabrics by cross-weaving, an up-and-down movement, as herein explained; and, also, the mounting of such wires or intruments on axes.

And I also claim the so arranging apparatus in a loom, that the pile of fabrics woven therein, when the pile is produced from the warp, by cross-weavings, shall be cut by rotatory cutters, acting in the ends of the wires or instruments on which the pile is formed.

Secondly, I claim the mode of arranging looms for the manufacture of double fabric, as described.

Thirdly, I claim the mode of arranging revolving shuttle-boxes; and I also claim controlling of the movements of revolving shuttle-boxes, by jacquard apparatus.

Fourthly, I claim the controlling the selection of pickers, by jacquard apparatus.

Fifthly, I claim the mode of arranging apparatus in connexion with loose reeds, by which such loose reeds will be released when the shuttle is trapped in the shed, as described.

And, sixthly, I claim the mode of arranging parts in connexion with jacquard apparatus, by which a repetition of certain cards, or a set of cards, may be effected.—In witness, &c.

FREDERIC WILLIAM MOWBRAY.

Enrolled April 21, 1852.

PATENTS SEALED TO MARCH 23, 1853.

74. CHRISTOPHER KINGSFORD, of No. 18, Buckingham-street, Adelphi, in the county of Middlesex, Engineer, for Machinery for solidifying peat coal, and other substances of a like nature.—Dated October 1, 1852. Sealed February 26, 1853.

87. ROBERT ROBERTSON MENZIES, of Glasgow, in the county of Lanark, North Britain, Warehouseman, for Improvements in the manufacture of carpets, and other fabrics.—Dated October 1, 1852. Sealed February 26, 1853.

172. JOHN JOBSON, of Litchurch, in the county of Derby, Ironfounder, for Improvements in manufacturing moulds for casting metal. —Dated October 2, 1852. Sealed February 26, 1853.

179. FREDERIC NEWTON, of Fleet-street, in the city of London, Optician, for Improvements in the apparatus to be employed for producing photographic pictures.—Dated October 2, 1852. Sealed February 26, 1853.

672. STEPHEN CAREY, of Great Guildford-street, Southwark, in the county of Surrey, Builder, for Certain Improvements in the construction of viaducts, arches, bridges, and other buildings, upon a non-expansion principle.—Dated November 8, 1852. Sealed February 26, 1853.

941. THOMAS COLLINS BANFIELD, of No. 18, Queen's-square, in the city of Westminster, in the county of Middlesex, Gentleman, for Improvements in the process of an apparatus for extracting saccharine and other juices from beet-root, or other roots and plants.—(A communication.)—Dated December 3, 1852. Sealed February 26, 1853.

1192. ARCHIBALD DOUGLAS BROWN, of Glasgow, in the county of Lanark, North Britain, Cabinet Maker, for Improvements in the construction of portable articles of furniture.—Dated December 29, 1852. Sealed February 26, 1853.

12. EDME AUGUSTIN CHAMEROY, of Paris, France, Manufacturer, for Improvements in motive power engines, and in the application of motive power to the same.—Dated January 3, 1853. Sealed February 26, 1853.

8. RICHARD WRIGHT, of Greenwich, in the county of Kent, Gentleman, for Improvements in constructing vessels.—Dated October 1, 1852. Sealed March 2, 1853.

135. ROBERT GRIFFITHS, of Great Ormond-street, in the county of Middlesex, Engineer, for Improvements in apparatus for indicating the number of persons entering and the distance travelled in public

or other conveyances and places, and for the prevention of fraud upon proprietors of public conveyances.—Dated October 1, 1852. Sealed March 2, 1853.

210. HENRY WEBB, of Willenhall, in the county of Stafford, Engineer, and JOSEPH FROYSELL, of the same place, Surgeon, for Improvements in fastening knobs to door, and other locks. — Dated October 4, 1852. Sealed March 2, 1853.

447. GEORGE GADD, of Fisher Gate, in the town and county of the town of Nottingham, Engineer, for Improvements in apparatus for roasting coffee.—Dated October 19, 1852. Sealed March 2, 1853.

954. SAMUEL NEVILLE, of Gateshead, in the county of Durham, Glass Manufacturer, for Improvements in the manufacture of lamp glasses and globes.—Dated December 3, 1852. Sealed March 2, 1853.

1053. ISHAM BAGGS, of Liverpool-street, in the county of Middlesex, Engineer, for Improvements in obtaining or extracting gold and silver from their ores.—Dated December 14, 1852. Sealed March 2, 1853.

1086. GEORGE MICHIELS, of No. 57, Holywell-street, Westminster, in the county of Middlesex, for Improvements in the manufacture and purification of gas.—Dated December 16, 1852. Sealed March 2, 1853.

1119. JEAN BAPTISTE MOINIER, of Rue de Marseille, and CHARLES CONSTANT BOUTIGNY, of Rue de Flandre, of La Villette, France, for Improvements in concentrating syrups and other solutions, and in distillation.—Dated December 21, 1852. Sealed March 2, 1853.

1121. GEORGE BEADON, of Creech Barrow, near Taunton, in the county of Somerset, now of Saint Mary's, Scilly, Commander in the Royal Navy, for Improvements in constructing and propelling ships and vessels.—Dated December 21, 1852. Sealed March 2, 1853.

1147. GEORGE GWYNNE, of Hyde Park-square, in the county of Middlesex, Esquire, and GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, in the county of Surrey, Managing Director of Price's Patent Candle Company, for Improvements in treating fatty and oily matters.—Dated December 23, 1852. Sealed March 2, 1853.

1160. GEORGE MICHIELS, of No. 57, Holywell-street, Westminster, in the county of Middlesex, for Improvements in the manufacture of gas.—Dated December 24, 1852. Sealed March 2, 1853.

1180. WILLIAM BUSFIELD, of Bradford, in the county of York, Overlooker to Messrs. Waud and Co., of the same place, for Improvements in apparatus for combing wool and other fibrous substances requiring like process.—Dated December 28, 1852. Sealed March 2, 1853.

1206. ROBERT TAYLERSON, of Three Indian Kings'-court, Newcastle-upon-Tyne, for Improvements in ship-building.—Dated December 30, 1852. Sealed March 2, 1853.

5. JOSEPH JOHN WILLIAM WATSON, of Old Kent-road, in the county of Surrey, Doctor of Philosophy, and WILLIAM PROSSER, of Adam-street, Adelphi, in the county of Middlesex, Gentleman, for An improved method of manufacturing steel and of carburizing iron. —Dated January 1, 1853. Sealed March 2, 1853.

11. JOHN BLEACKLEY, junior, of Myrtle-grove, Prestwich, in the county of Lancaster, Bleacher, for Improvements in machinery to be used in washing, bleaching, dyeing, and sizing yarns and fabrics.— —Dated January 3, 1853. Sealed March 2, 1853.

182. SAMUEL GEORGE ARCHIBALD, of Pall-mall, in the county of Middlesex, Gentleman, for An improved mode of extracting or rendering animal fats and oils.—Dated October 2, 1852. Sealed March 5, 1853.

228. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in machinery for boring or cutting rocks or other hard substances for the purpose of tunnelling through mountains, or making other excavations.—Dated October 5, 1852. Sealed March 5, 1853.—(Communication.)

229. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the means of producing a vacuum for various purposes, such as condensing steam, pumping water, exhausting air, or other purposes where a vacuum is required.—Dated October 5, 1852.—Sealed March 5, 1853.—(Communication.)

256. JOHN CRONIN JEFFCOTT, of No. 1, Anglesea-street, in the county of the city of Cork, Agriculturist, for Producing heat for generating steam, and applicable to and for other purposes for which this invention has not been hitherto used, under the name and title of a heat producer and steam generator.—Dated October 6, 1852. Sealed March 5, 1853.

269. WILLIAM VAUGHAN MORGAN, of Jewin-crescent, in the city of London, Merchant, for Improvements in the preparation of oils for the purposes of illumination and lubricating machinery.—Dated October 6, 1852. Sealed March 5, 1853.

401. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in washing and amalgamating gold and other metals.—Dated October 15, 1852.—Sealed March 5, 1853.—(Communication.)

442. WILLIAM NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for An improved machine for separating ores, metals, and other heavy substances from mud, sand, gravel, stones, and other impurities.—Dated October 19, 1852. Sealed March 5, 1853.—(Communication.)

676. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the manufacture of the carbonates of soda.—Dated November 8, 1852. Sealed March 5, 1853.—(Communication.)

690. JAMES C. BOOTH, of the city and county of Philadelphia, in the state of Pennsylvania, United States of America, Chemist, for Manufacturing chromate and bichromate of potash from chromic iron or chrome ore.—Dated November 9, 1852. Sealed March 5, 1853.

692. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the County of Middlesex, Civil Engineer, for Improvements in the construction of axles or axletrees.—Dated November 9, 1852. Sealed March 5, 1853.—(Communication.)

722. GEORGE KENDALL, of the city of Providence, in the state of Rhode Island, in the United States of America, Gentleman, for Certain improvements in apparatus to facilitate the manufacturing of mould candles.—Dated November 12, 1852. Sealed March 5, 1853.

816. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the manufacture of paper.—Dated November 22, 1852. Sealed March 5, 1853.—(A communication.)

966. JAMES BUCHANAN, of Glasgow, in the county of Lanark, Manufacturer, for Improvements in the treatment of flax and other similar vegetable fibrous substances, and in the machinery employed therein.—Dated December 6, 1852. Sealed March 5, 1853.

1041. ALFRED VINCENT NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Mechanical Draughtsman, for Improved apparatus for regulating the density of fluids.—Dated December 13, 1852. Sealed March 5, 1853.—(A communication.)

1079. SIR FRANCIS CHARLES KNOWLES, of Lovel-hill, in the county of Berks, Baronet, for Improvements in the manufacture of iron.—Dated December 16, 1852. Sealed March 5, 1853.

1163. ALFRED VINCENT NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Mechanical Draughtsman, for Improvements in obtaining and applying motive power.—Dated December 24, 1852. Sealed March 5, 1853.—(A communication.)

31. WILLIAM LOUIS SHERINGHAM, of Southsea, in the county of Hants, a Captain in Her Majesty's Royal Navy, for Illuminating buoys and beacons in harbours, roadsteads, and rivers.—Dated January 6, 1853. Sealed March 5, 1853.

40. WILLIAM BEALES, of Louth, in the county of Lincoln, Engineer, for An improved cement for the resistance of fire.—Dated January 6, 1853. Sealed March 5, 1853.

23. JEAN BAPTISTE LAVANCHY, of Richmond-buildings, Soho, in the county of Middlesex, Musical Instrument Maker, for Improvements in wind musical instruments where metal tongues are employed.—Dated October 1, 1852. Sealed March 9, 1853.

140. THOMAS ROBSON, of Woolwich-road, in the county of Kent, for Improvements in apparatus for igniting signal and other lights.—Dated October 1, 1852. Sealed March 9, 1853.

153. DAVID STEPHENS BROWN, of No. 2, Alexandrian-lodge, Old Kent-road, Surrey, Gentleman, for An improved means of navigating the water by ships.—Dated October 2, 1852. Sealed March 9, 1853.

164. JOHN ROBERT JOHNSON, of Stanbrook Cottage, Hammersmith, in the county of Middlesex, Chemist, for Improvements in fixing colouring matter of madder in printing and dying.—Dated October 2, 1852. Sealed March 9, 1853.

168. JOHN MACINTOSH, of Berners-street, in the county of Middlesex, for Improvements in compositions to be used as paints.—Dated October 2, 1852. Sealed March 9, 1853.

238. WILLIAM GILBERT ELLIOTT, of Blisworth, in the county of Northampton, Gentleman, for Improvements in the manufacture of bricks, pipes, tiles, and other articles capable of being moulded.—Dated October 5, 1852. Sealed March 9, 1853.

521. JOHN CASS, of Bluepits, near Rochdale, in the county of Lancaster, Engineer and Millwright, for Improvements in steam-engines.—Dated October 26, 1852. Sealed March 9, 1853.

631. HARRISON BLAIR, of Colthurst, in the parish of Mitten, and county of York, for Improvements in apparatus for supplying steam-boilers with water.—Dated November 3, 1852. Sealed March 9, 1853.

768. JOHN WHEELEY LEA, of the city of Worcester, Chemist, and WILLIAM HUNT, of Stoke Prior, in the county of Worcester, Manufacturing Chemist, for Improvements in utilizing the waste heat of coke furnaces.—Dated November 15, 1852. Sealed March 9, 1853.

793. JOHN ROBERT JOHNSON, of Stanbrook Cottage, Hammersmith,

in the county of Middlesex, for Improvements in the manufacture of type or raised surfaces for printing.—Dated November 19, 1852. Sealed March 9, 1853.

815. JOHN WHEELEY LEA, of the city of Worcester, Chemist, and WILLIAM HUNT, of Stoke Prior, in the county of Worcester, Manufacturing Chemist, for Improvements in the manufacture of iron.— —Dated November 22, 1852. Sealed March 9, 1853.

882. ANTONIO FEDELE COSSUS, of University-street, in the county of Middlesex, for Improvements in lubricating apparatus.—Dated November 26, 1852. Sealed March 9, 1853.

903. FRANCIS WILLIAM ELLINGTON, of Drummond-street, Euston-square, in the county of Middlesex, for Improvements in making of screws for collapsible and other vessels.—Dated November 29, 1852. Sealed March 9, 1853.

987. ALFRED VINCENT NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Mechanical Draughtsman, for An improved mode of transportation for the conveyance of letters, packages, freight, or passengers from one place to another.—Dated December 7, 1852. Sealed March 9, 1853.—(Communication.)

1101. THOMAS ELLIOTT, of Stockton-on-Tees, in the county of Durham, Engineer, for Improvements in steam-engines, which are also applicable to pumps.—Dated December 18, 1852. Sealed March 9, 1853.

1126. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in lamps, and in apparatus to be used therewith.—Dated December 21, 1852. Sealed March 9, 1853.—(Communication.)

1130. ALFRED VINCENT NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Mechanical Draughtsman, for Improvements in the means of urging the fires and increasing the draft of furnaces, and in arresting the sparks given off from the chimneys of locomotive engines.—Dated December 22, 1852. Sealed March 9, 1853.—(Communication.)

1135. WILLIAM ASPDIN, of Blackwall, Gateshead-upon-Tyne, in the county of Durham, Cement Manufacturer, for Improvements in the manufacture of Portland and other cements.—Dated December 22, 1852. Sealed March 9, 1853.

1186. JOHN COPLING, junior, of the Grove, Hackney, in the county of Middlesex, Esquire, for A safeguard railway signal.—Dated December 29, 1852. Sealed March 9, 1853.

1191. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the manufacture of carpets.—Dated December 29, 1852. Sealed March 9, 1853. —(Communication.)

6. THOMAS BILLYEALD, of Ison-green, in the parish of Lenton, in the county of Nottingham, and of Albert-street, in the town and county of the town of Nottingham, Lace Manufacturer, for An improvement in the apparatus and arrangement of apparatus for making looped fabrics.—Dated December 29, 1852. Sealed March 9, 1853.

32. EDWARD HUTCHINSON, of Tyldesley, in the county of Lancaster, Corn Miller, for Certain improvements in the mode or method of preparing, cleaning, drying, and otherwise treating wheat, pulse, seeds, and other grain.—Dated January 7, 1853. Sealed March 9, 1853.

41. PETER GRAHAM, of Oxford-street, in the county of Middlesex,

for Improvements in the manufacture of carpets and other piled fabrics.—Dated January 6, 1853. Sealed March 9, 1853.—(A communication.)

50. RICHARD GITTINS, of No. 2, Thayer-street, Manchester-square, in the county of Middlesex, for Improvements in tills.—Dated January 7, 1853. Sealed March 9, 1853.

66. JOHN DAVIE MORRIES STIRLING, of the Larches, Camphill, near Birmingham, in the county of Warwick, for Improvements in the manufacture of percussion-caps.—Dated January 10, 1853. Sealed March 9, 1853.

72. JAMES THORNTON, of Derby, in the county of Derby, Mechanic, JOHN THORNTON, of Melbourne, in the said county, Mechanic, and ALBERT THORNTON, of the same place, Mechanic, for Improved nets and other textile fabrics to be used for gloves and other purposes, and for the machinery to be employed in the manufacture thereof.—Dated January 11, 1853. Sealed March 9, 1853.

73. JOSEPH ROBERT WILKIN ATKINSON, of Leeds, in the county of York, Flax-spinner, for Improvements in machinery for preparing and spinning flax, tow, and other fibrous substances.—Dated January 11, 1853. Sealed March 9, 1853.

86. EDWARD HASLEWOOD, of Tufnel-park, Holloway, in the county of Middlesex, for Improvements in fire-arms and projectiles.—Dated January 12, 1853. Sealed March 9, 1853.—(A communication.)

89. JOHN BENNETT, of Bradley Mills, Huddersfield, in the county of York, Woollen Manufacturer, and HENRY CHARLESWORTH, of Huddersfield, aforesaid, Card Manufacturer, for Improvements in doffing and preparing rovings of wool.—Dated January 12, 1853. Sealed March 9, 1853.

101. WILLIAM STEADS, of Redcross-street, in the county of Leicester, for Improvements in blinds, maps, charts, and other articles wound on rollers.—Dated January 12, 1853. Sealed March 9, 1853.

121. HENRY BROWNING, of Bristol, in the county of Somerset, Painter, for Improvements in preparing compositions for coating iron and other ships' bottoms, and other surfaces.—Dated January 18, 1853. Sealed March 9, 1853.

123. ORLANDO REEVES, of the Castle, Taunton, in the county of Somerset, for Improvements in the manufacture of manure.—Dated January 18, 1853. Sealed March 9, 1853.

130. SYDNEY SMIRKE, of No. 24, Berkeley-square, in the county of Middlesex, Esquire, for Improvements in apparatus for giving signals on railways.—Dated January 19, 1853. Sealed March 9, 1853.

182. WARREN FISH SHATTOCK, of No. 373, Strand, in the county of Middlesex, Engineer, for a smut machine.—Dated January 25, 1853. Sealed March 9, 1853.

251. AUGUSTE EDOUARD LORADOUX BELLFORD, of No. 16, Castle-street, Holborn, in the city of London, for Improvements in sewing machines.—Dated October 6, 1852. Sealed March 12, 1853.

287. AUGUSTE EDOUARD LORADOUX BELLFORD, of No. 16, Castle-street, Holborn, in the city of London, for Improvements in steam-boilers.—Dated October 7, 1852. Sealed March 12, 1853.

301. SAMUEL SMITH, of Swinton, near Manchester, in the county of Lancaster, Manufacturer, for Certain improvements in looms for weaving.—Dated October 8, 1852. Sealed March 12, 1853.

575. PIERRE BERNARDET DE LUCENAY, of Paris, France, and of No. 4, South-street, Finsbury, London, for the Production of photographic images by means of artificial light.—Dated October 30, 1852. Sealed March 12, 1853.

982. PETER ARMAND LE COMTE DE FONTAINEMOREAU, of No. 4, South-street, Finsbury, London, for Improvements in constructing the bars of furnaces and grates.—Dated December 7, 1852. Sealed March 12, 1853.—(A Communication.)

53. THOMAS BROWNE DALZIEL, of Glasgow, in the county of Lanark, North Britain, Manager, for Improvements in the treatment or manufacture of textile fabrics or materials.—Dated October 1, 1852. Sealed March 16, 1853.

56. JOHN FINLAY, of Glasgow, in the county of Lanark, North Britain, Ironmonger, for Improvements in grates and fire-places, or apparatus for the generation of heat.—Dated October 1, 1852. Sealed March 16, 1853.

64. HENRY RICHARDSON FANSHAWE, of Arthur-street, Old Kent-road, in the county of Surrey, Chemist and Manufacturing Agent, for Certain improvements in shawls, scarfs, neckerchiefs, handkerchiefs, mantles, sails or sail-cloth, table-cloths and table-covers, napkins, and umbrella and parasol tops and covers, and in an Improved loom for weaving, applicable especially to the said improvements in respect to some of the said articles.—Dated October 1, 1852. Sealed March 16, 1853.

101. THOMAS ALLAN, of Adam-street, in the city of Westminster, Civil Engineer, for Improvements in the application of carbonic acid gas to motive purposes.—Dated October 1, 1852. Sealed March 16, 1853.

106. THOMAS ALLAN, of Adam-street, in the city of Westminster, Civil Engineer, for Improvements in propelling.—Dated October 1, 1852. Sealed March 16, 1853.

181. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in governors or regulators for regulating the pressure of gas as it passes from the main or other pipes to the burners.—Dated October 2, 1852. Sealed March 16, 1853.—(Communication.)

207. WILLIAM DONALD NAPIER, of George-street, in the city of Westminster, Gentleman, and WILLIAM LUND, of Cornhill, in the city of London, Manufacturer, for Improvements in apparatus for steering vessels.—Dated October 4, 1852. Sealed March 16, 1853.

219. ARTHUR RICHARD BURR, of Halesowen, in the county of Worcester, Engineer, for Certain improvements in making gun and pistol barrels applicable to the manufacture of other kinds of tubes.—Dated October 5, 1852. Sealed March 16, 1853.

231. GEORGE WALKER NICHOLSON, of Pendleton, in the county of Lancaster, Tool and Engine Fitter, for Improvements in screw-bolts, nuts, and washers, and in the machinery or apparatus for making the same.—Dated October 5, 1852.—Sealed March 16, 1853.

234. JOHN BALMFORTH, WILLIAM BALMFORTH, and THOMAS BALMFORTH, all of Clayton, in the county of Lancaster, Iron Masters, for Improvements in steam-boilers, and in fixing the same.—Dated October 5, 1852. Sealed March 16, 1853.

235. ADAM and JOHN BOOTH, both of Manchester, in the county of Lancaster, Machine Makers, for Improvements in platting or braid-

ing machines, which machines are applicable to manufacturing webs for making door and other mats.—Dated October 5, 1852. Sealed March 16, 1853.

259. GEORGE WALKER NICHOLSON, of Pendleton, in the county of Lancaster, Tool and Engine Fitter, for Improvements in vices, and in the means or method used for fixing the same.—Dated October 6, 1852. Sealed March 16, 1853.

260. WILLIAM COLES FULLER, of Bucklersbury, in the city of London, Patent Spring Manufacturer, and GEORGE MORRIS KNEVITT, of New York, in the United States of America, but now residing at Argyll-street, New-road, in the county of Middlesex, Gentleman, for Certain improvements in applying india-rubber or other similarly elastic substances as springs for carriages.—Dated October 6, 1852. Sealed March 16, 1853.

262. ROBERT MORTIMER GLOVER, of Newcastle-on-Tyne, Doctor of Medicine, and JOHN CAIL, of the same place, Mathematical Instrument Maker, for Improvements in miners' or safety-lamps.—Dated October 6, 1852. Sealed March 16, 1853.

286. AUGUSTE EDOUARD LORADOUX BELLFORD, of No. 16, Castle-street, Holborn, in the city of London, for An improvement in smoothing irons.—Dated October 7, 1852. Sealed March 16, 1853.

305. JOHN TALBOT TYLER, of Mount-street, Grosvenor-square, in the county of Middlesex, Hatter, for Improvements in hats, and in the preparation of plush or other covering used in the manufacture of hats.—Dated October 8, 1852. Sealed March 16, 1853.

321. SAMUEL HARDACRE, of Manchester, in the county of Lancaster, Machinist, for Improvements in machinery or apparatus for blowing, scutching, opening, cleaning, and sorting cotton, wool, and other fibrous substances, parts of which improvements are applicable to other purposes.—Dated October 9, 1852. Sealed March 16, 1853.

322. GEORGE GENT, of Northampton, in the county of Northampton, Grocer, and SAMUEL SMITH, of the same place and county, Agricultural Implement Maker, for A fruit cleaning and dressing machine.—Dated October 9, 1852. Sealed March 16, 1853.

341. EDWARD SIMONS, of Birmingham, in the county of Warwick, Tallow Chandler, for Improvements in lamps.—Dated October 12, 1852. Sealed March 16, 1853.

347. AUGUSTE EDOUARD LORADOUX BELLFORD, of No. 16, Castle-street, Holborn, for Improvements in sewing cloth and other materials. —Dated October 12, 1852. Sealed March 16, 1853.

354. JOSEPH WALKER, of Dover, in the county of Kent, Merchant, for Improvements in machinery for crushing and bruising malt, grain, and seeds.—Dated October 12, 1852. Sealed March 16, 1853.

356. JOSEPH ROBINSON, of Southampton, in the county of Hants, Superintendent Joiner to the Peninsular and Oriental Steam Company, for Improvements in ventilators.—Dated October 12, 1852. Sealed March 16, 1853.

515. ROBERT WILLIAM MITCHESON, of the firm of Mitcheson and Sons, of Garford-street, in the county of Middlesex, Anchor Smiths, for Improvements in anchors.—Dated October 25, 1852. Sealed March 16, 1853.

529. ROBERT WILLIAM MITCHESON, of the firm of Mitcheson and Sons, of Garford-street, in the county of Middlesex, Anchor

Smiths, for An improved safety hook.—Dated October 26, 1852. Sealed March 16, 1853.

538. ALFRED CHARLES HERVIER, Civil Engineer, of Paris, France, and No. 4, South-street, Finsbury, London, for An improvement in the application of centrifugal force to propelling on water.—Dated October 27, 1852. Sealed March 16, 1853.

543. JOHN NORTON, Esquire, of Cork, in the county of Cork, Captain, late of Her Majesty's Thirty-fourth Foot, for Improvements in blasting.—Dated October 27, 1852. Sealed March 16, 1853.

615. CHARLES DICKSON ARCHIBALD, Esquire, of Rusland-hall, Milnthorpe, in the county of Westmoreland, for Improvements in lighting and heating.—Dated November 2, 1852. Sealed March 16, 1853.

739. AMORY HAWKESWORTH, of Abbey-road, Torquay, in the county of Devon, for Improvements in life boats.—Dated November 13, 1852. Sealed March 16, 1853.

1120. JEAN BAPTISTE MOINIER, of Rue de Marseilles, and CHARLES CONSTANT BOUTIGNY, of Rue de Flandre of La Villette, France, for Improvements in distilling fatty matters.—Dated December 21, 1852. Sealed March 16, 1853.

1182. JAMES WEBSTER, of Leicester, in the county of Leicester, Engineer, for Improvements in the manufacture of springs.—Dated December 28, 1852. Sealed March 16, 1853.

64. MICHAEL FITCH, of Chelmsford, in the county of Essex, Patent Salt Manufacturer, for Improvements in ovens.—Dated January 10, 1853. Sealed March 16, 1853.

74. THOMAS COTTRELL, of Westbromwich, in the county of Stafford, for Improvements in the manufacture of certain salts of soda.—Dated January 11, 1853. Sealed March 16, 1853.

92. WILLIAM BROWN, of the city of Glasgow, Merchant, for An improved method of treating coal and bituminous substances, and for improvements in the treatment of their volatile products.—Dated January 13, 1853. Sealed March 16, 1853.

94. WILLIAM WILLS UREN, of Walkhampton, in the county of Devonshire, for The manufacture of bricks, pipes, tiles, imitation stone, and peat bricks, for fuel, by the means of a machine, and arrangements of machinery, entitled a central circular and horizontal motion.—January 13, 1853. Sealed March 16, 1853.

103. JAMES STEWART KINCAID, of Dublin, Gentleman, for Improvements in ascertaining and registering the number of persons entering or quitting omnibuses or other vehicles or vessels, which improvements are applicable, in whole or in part, to buildings or other places.—Dated January 15, 1853. Sealed March 16, 1853.

108. PETER ALEXANDER HALKETT, of Richmond-hill, in the county of Surrey, Lieutenant in the Royal Navy, for An improved construction of inkstand.—Dated January 15, 1853. Sealed March 16, 1853.

117. HENRY HENSON HENSON and WILLIAM FREDERICK HENSON, both of Hampstead, in the county of Middlesex, Civil Engineers, for Improvements in signalizing on railways, and in the apparatus used therein.—Dated January 17, 1853. Sealed March 16, 1853.

125. PETER FAIRBAIRN, of Leeds, in the county of York, Machinist, and SAMUEL RENY MATHERS, of Leeds, aforesaid, Flax-spinner, for Certain improvements in machinery for drawing the sliver and rove of

flax, hemp, and tow.—Dated January 18, 1853. Sealed March 16, 1853.

129. WILLIAM VINCENT, of No. 195, Brick-lane, Spitalfields, in the county of Middlesex, of the firm of Noakes and Vincent, for Improvements in cocks or taps.—Dated January 19, 1853. Sealed March 16, 1853.

131. JOSEPH ROCK COOPER, of Birmingham, in the county of Warwick, Gun Maker, for Improvements in fire-arms.—Dated January 19, 1853. Sealed March 16, 1853.

144. WILLIAM RIDDLE, of East Temple Chambers, in the county of Middlesex, for Improvements in ornamenting walls, ceilings, and other surfaces.—Dated January 20, 1853. Sealed March 16, 1853.

153. JAMES MIDDLEMASS, of Edinburgh, in the county of Mid Lothian, Scotland, Merchant and Outfitter, for The application of a new material to the construction of portable houses and other buildings. —Dated January 21, 1853. Sealed March 16, 1853.

160. JOHN CHUBB, of St. Paul's Churchyard, Patent Lock Manufacturer, and JOHN GOATER, Lock Maker, in the employ of the said John Chubb, for Improvements in Locks and Latches.—Dated January 21, 1853. Sealed March 16, 1853.

177. CHARLES RANDOLPH and JOHN ELDER, both of Glasgow, in the county of Lanark, Engineers, partners of the firm of Randolph, Elder, and Company, of that place, for Improvements in propelling vessels.—Dated January 24, 1853. Sealed March 16, 1853.

188. JOHN SANGSTER, of Cheapside, in the city of London, for Improvements in umbrellas and parasols.—Dated January 25, 1853. Sealed March 16, 1853.—(Communication.)

12. THOMAS WOOD GRAY, of Warkworth-terrace, Commercial-road, Limehouse, in the county of Middlesex, for Improvements in steam engines.—Dated October 1, 1852. Sealed March 19, 1853.

377. MARTYN JOHN ROBERTS, of Woodbank, Gerrard's Cross, in the county of Bucks, Gentleman, for Improvements in galvanic batteries, and in obtaining chemical products therefrom.—Dated October 13, 1852. Sealed March 19, 1853.

435. JOHN GOODMAN, of Hazel Grove, in the county of Chester, Doctor of Medicine, for An improved fountain pen.—Dated October 19th, 1852. Sealed March 19, 1853.

508. WILLIAM WHITE, of the firm of William White and Son, of Cheapside, in the city of London, Hat Manufacturers, for An improved fabric suitable for ventilating hat bodies.—Dated October 23, 1852. Sealed March 19, 1853.

553. CHARLES FREDERICK BIELEFELD, of the Strand, in the county of Middlesex, for Improvements in billiard and bagatelle tables. —Dated October 28, 1852. Sealed March 19, 1853.

593. EDWARD LAWSON, Machine Maker, of Leeds, in the county of York, for Certain improvements in machinery for preparing to be spun hemp, flax, tow, wool, silk, cotton, and other fibrous materials.—Dated November 1, 1852. Sealed March 19, 1853.

832. JOHN BEALE, of East Greenwich, in the county of Kent, Engineer, for An improved arrangement of steam engine, and an improved packing to be used therein.—Dated November 23, 1852. Sealed March 19, 1853.

1139. JOHN LIVESEY, of New Lenton, in the county of Nottingham,

Draughtsman, for Improvements in lace machinery and in piled fabrics made from such machinery:—Dated December 22, 1852. Sealed March 19, 1853.

1189. BENJAMIN GLORNEY, of Mardyke Mills, near Dublin, in the kingdom of Ireland, Miller and Manufacturer, for Improvements in obtaining and applying motive power.—Dated December 29, 1852. Sealed March 19, 1853.

38. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in roving, spinning, or twisting cotton or other fibrous substances, which invention he denominates "Larvill's Improvements."—Dated January 6, 1853. Sealed March 19, 1853.—(Communication.)

39. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the construction of bearings or steps for shafts, turntables, or moveable platforms, which invention I denominate "Parry's Improvements."—Dated January 6, 1853. Sealed March 19, 1853.—(Communication.)

85. WILLIAM MAIRNE, of South Inch Mill, Perth, in the county of Perth, Flax Spinner, for Improvements in reeling yarns or threads. —Dated January 12, 1853. Sealed March 19, 1853.

111. THOMAS CROPPER RYLEY, of Haigh Foundry, near Wigan, in the county of Lancaster, Engineer, and EDWARD EVANS, of the same place, Engineer, for Certain improvements in the construction of wrought iron wheels to be used upon railways or for other purposes, and in the machinery or apparatus connected therewith.—Dated January 17, 1853. Sealed March 19, 1853.

18. THOMAS DICKASON ROTCH, of Furnival's-inn, in the county of Middlesex, Gentleman, for Improvements in treating peat and in manufacturing fuel and other products therefrom.—Dated October 1, 1852. Sealed March 23, 1853.

76. CHRISTOPHER JAMES SCHOFIELD, of Cornbrook, Hulme, in the county of Lancaster, Gentleman, for Improvements in machinery or apparatus for cutting the pile of fustians and other fabrics.—Dated October 1, 1852. Sealed March 2, 1853.

90. JOHN ASPINALL, of King William-street, in the city of London, Engineer, for Improvements in evaporating cane juice and other liquids, and in apparatus for that purpose.—Dated October 1, 1852. Sealed March 23, 1853.

100. WILLIAM POTTS, of Birmingham, in the county of Warwick, for Improvements in sepulchral monuments.—Dated October 1, 1852. Sealed March 23, 1853.

107. HENRY COLUMBUS HURRY, of Adam-street, Adelphi, in the county of Middlesex, Civil Engineer, for An improved construction of fountain pen or reservoir penholder.—Dated October 1, 1852. Sealed March 23, 1853.

178. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in stoppers for bottles and other similar vessels.—Dated October 2, 1852. Sealed March 23, 1853.

189. ALEXANDER WILLISON, of the Manse of Dundonald, in the county of Ayr, North Britain, Minister of Dundonald, for Improvements in threshing machinery.—Dated October 2, 1852. Sealed March 23, 1853.

216. ARCHIBALD BROWN, of Glasgow, in the county of Lanark, North Britain, Block Maker, for Improvements in the construction of sheaves for blocks.—Dated October 4, 1852. Sealed March 23, 1853.

220. DAVID STEPHEN BROWN, of No. 2, Alexandrian Lodge, Old Kent-road, Surrey, Gentleman, for An improved apparatus or instrument for evaporating or distilling liquids.—Dated October 5, 1852. Sealed March 23, 1853.

226. DIEGO JIMENEZ, of Percy-street, in the county of Middlesex, Merchant, for Improvements in the manufacture of soap.—Dated October 5, 1852. Sealed March 23, 1853.

252. JACOB TILTON SLADE, of Pall-mall, in the county of Middlesex, Gentleman, for An improved mode of driving certain machines, and an improved driving-band or chain to be used therewith.—Dated October 6, 1852. Sealed March 23, 1853.

267. THOMAS BARKER WALKER GALE, and JONATHAN FENSOM, of Homerton, in the county of Middlesex, Engineers, for Improvements in the means of joining or coupling bands or straps.—Dated October 6, 1852. Sealed March 23, 1853.

280. WILLIAM BISSELL, of Wolverhampton, for An improved cramp or improved cramps, for cramping floors, doors, and joiners' and ship-work generally.—Dated October 7, 1852. Sealed March 23, 1853.

310. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the construction of hydraulic rams.—Dated October 8, 1852. Sealed March 23, 1853.

352. THOMAS DAWSON, of Melton-street, in the county of Middlesex, Mechanist, for Improvements in the means of cutting pile or terry fabrics.—Dated October 12, 1852. Sealed March 23, 1853.

353. THOMAS LACEY, of Grafton-street, in the county of Middlesex, Engineer, for Improvements in apparatus for raising liquids, and in joints for uniting india-rubber and other like flexible tubing.—Dated October 12, 1852. Sealed March 23, 1853.

361. JOSEPH PIMLOTT OATES, of Lichfield, in the county of Stafford, Surgeon, for An improved spring or improved springs for carriages.—Dated October 13, 1852. Sealed March 23, 1853.

388. ALSOP SMITH, of Westminster in the county of Middlesex, for Improvements in the manufacture of firewood.—Dated October 14, 1852. Sealed March 23, 1853.

455. AUGUSTE EDOUARD LORADOUX BELLFORD, of No. 16, Castle-street, Holborn, in the city of London, for Improvements in cocks or taps.—Dated October 20, 1852. Sealed March 23, 1853.

584. GEORGE THOMAS SELBY, of Smethwick Tube Works, Birmingham, in the county of Warwick, Engineer, for Improvements in steam-boilers.—Dated October 23, 1852. Sealed March 23, 1853.

586. GEORGE THOMAS SELBY, of Smethwick Tube Works, Bir-

mingham, in the county of Warwick, Engineer, for Improvements in machinery for the manufacture of tubes and pipes.—Dated October 30, 1852. Sealed March 23, 1853.

610. William Edward Newton, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the manufacture of capsules or covers for bottles and other hollow articles.—Dated November 2, 1852. Sealed March 23, 1853.—(Communication.)

612. James Dible, of Northam, in the county of Hants, Shipwright, for Improvements in ventilating and heating ships, which improvements are also applicable to extinguishing fire on board ship.—Dated November 2, 1852. Sealed March 23, 1853.

647. John Henderson Porter, of Birmingham, in the county of Warwick, Engineer, for Improvements in the construction of portable buildings and other structures.—Dated November 5, 1852. Sealed March 23, 1853.

686. Nelson M'Carthy, of Cork, in the county of Cork, for Improvements in boots and shoes.—Dated November 9, 1852. Sealed March 23, 1853.

714. Henry Huart, of Cambrai, in the Republic of France, for Improvements in the storing and preservation of grain.—Dated November 11, 1852. Sealed March 23, 1853.

806. William Dray, of the firm of William Dray and Company, of Swan-lane, in the city of London, Agricultural Implement Makers, for Improvements in machinery for crushing, bruising, and pulverizing.—Dated November 20, 1852. Sealed March 23, 1853.

828. Michael Leopold Parnell, of Little Queen-street, Holborn, in the county of Middlesex, Lock Manufacturer, for Improvements in the construction of box-staples and striking-plates.—Dated November 23, 1852. Sealed March 23, 1853.

884. Robert Barnard Feather, of Liverpool, Merchant, for Improvements in the construction of ships, and in rendering ships and boats impervious to shot.—Dated November 26, 1852. Sealed March 23, 1853.

892. Daniel Woodall, of Oldbury, in the county of Worcester, Boiler Maker, for Improvements in canal-boats.—Dated November 27, 1852. Sealed March 23, 1853.

958. Alexander Lawrie, Chief Engineer of Her Majesty's Dockyard, Chatham, in the county of Kent, for Improvements in the manufacture of oars and similar articles.—Dated December 4, 1852. Sealed March 23, 1853.

35. Edme Augustin Chameroy, of Paris, France, Manufacturer, for A new composition of different metals or metallic substances.—Dated January 6, 1853. Sealed March 23, 1853.

137. John Crabtree, of Heywood, in the county of Lancaster, Cotton Spinner, for Improvements in machinery for winding and doubling yarns.—Dated January 20, 1853. Sealed March 23, 1853.

146. AUGUSTUS THOMAS JOHN BULLOCK, Lieutenant, Royal Navy, for Improvements in taps and cocks.—Dated January 20, 1853. Sealed March 23, 1853.

158. WILLIAM JOSEPH CURTIS, of No. 23, Birchin-lane, in the City of London, in the county of Middlesex, Civil Engineer, for Excavating or digging earth, and for carrying or delivering the soil.—Dated January 21, 1853. Sealed March 23, 1853.

174. DAVID CLOVIS KNAB, Operative Chemist, of Rue Rossini, Paris, France, for Improvements in the process of and apparatus for distilling certain vegetable and mineral matters, and also animal bones and flesh.—Dated January 24, 1853. Sealed March 23, 1853.

187. FREDERICK SIMPSON, of Red-hill, in the county of Surrey, Cement Merchant, for Improvements in combining materials for cleansing or whitening stone.—Dated January 25, 1853. Sealed March 23, 1853.

189. ALFRED VINCENT NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Mechanical Draughtsman, for Improvements in the manufacture of printing surfaces.—Dated January 25, 1853. Sealed March 23, 1853.—(Communication.)

191. ROBERT WILLIAM SIEVIER, of Upper Holloway, in the county of Middlesex, Gentleman, and ROBERT WILLIAM WAITHMAN, of High Bentham, in the West Riding of the county of York, Gentleman, for Improvements in bleaching animal and vegetable fibrous materials.—Dated January 25, 1853. Sealed March 23, 1853.

193. JOHN EDWARD MAYALL, of Regent-street, in the county of Middlesex, Photographist, for Improvements in the production of crayon effects by the daguerrotype and photographic processes.—Dated January 25, 1853. Sealed March 23, 1853.

200. JOHN HENRY JOHNSON, of No. 47, Lincoln's-inn-fields, in the county of Middlesex, and of Glasgow, North Britain, Gentleman, for Improvements in the method of lubricating machinery, and in the mechanism or apparatus employed therein.—Dated January 26, 1853. Sealed March 23, 1853.—(Communication.)

201. JAMES COMBE, of Belfast, in the kingdom of Ireland, Machine Maker, for Improvements in machinery for hackling or combing flax and other fibrous substances.—Dated January 26, 1853. Sealed March 23, 1853.

212. WILLIAM TRANTER, of Birmingham, in the county of Warwick, Gun Maker, for Certain improvements in fire-arms.—Dated January 28, 1853. Sealed March 23, 1853.

216. GEORGE EDMOND DONISTHORPE and JOHN CROFTS, of Leeds, in the county of York, for Improvements in combing wool, hair, or other fibrous materials.—Dated January 28, 1853. Sealed March 23, 1853.

217. JAMES POLE KINGSTON, of No. 5, Lewisham-road, in the county of Kent, for Improvements in combining metals for the bearings and packings of machinery.—Dated January 28, 1853. Sealed March 23, 1853.

219. JOHN SCOTT RUSSELL, of Great George-street, Westminster, in the county of Middlesex, for Improvements in constructing ships and vessels propelled by screw or such-like propeller.—Dated January 28, 1853. Sealed March 23, 1853.

223. HAROLD POTTER, of Darwen, in the county of Lancaster, Carpet Manufacturer, for Improvements in the mode or method of producing a certain colour or colours on woven or textile fabrics and yarns, and in the machinery or apparatus connected therewith.—Dated January 29, 1853. Sealed March 23, 1853.

226. HENRY MOORHOUSE, of Denton, in the county of Lancaster, Tailor, for Improvements in the mode or method of preparing cotton, wool, flax, or other fibrous materials, and in the machinery or apparatus employed therein.—Dated January 29, 1853. Sealed March 23, 1853.

231. RICHARD ARCHIBALD BROOMAN, of the firm of Robertson, Brooman, and Company, of No. 166, Fleet-street, in the city of London, for Improvements in diving-bells, and apparatus to be used in connexion therewith.—Dated January 29, 1853. Sealed March 23, 1853.

234. WILLIAM WATSON HEWITSON, of Spring-field-mount, Leeds, in the county of York, for Improvements in suspending or applying mariners' compasses, in vessels built of iron, or partly of iron.—Dated January 29, 1853. Sealed March 23, 1853.

240. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in machinery for dressing cloth.—Dated January 29, 1853. Sealed March 23, 1853. —(Communication.)

257. ISRAEL P. MAGOON, of the State of Vermont, of the United States of America, for a New and useful improvement in steam-boiler chimneys.—Dated January 31, 1853. Sealed March 23, 1853.

272. JOSHUA MURGATROYD, of Heaton Norris, in the county of Lancaster, Millwright and Engineer, for Improvements in the construction of boilers and apparatus connected therewith.—Dated February 1, 1853. Sealed March 23, 1853.

UNDER OLD LAW.

JOSEPH GIBBS, of Devonshire-street, in the county of Middlesex, Civil Engineer, for Improvements in the treatment of metals and metalliferous ores.—Sealed March 21, 1853.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 5. Vol. XXI. ENLARGED SERIES.—MAY, 1853.

Specification of the Patent granted to Edmund Morewood, *of Enfield, in the County of Middlesex, and* George Rogers, *of the same place, Gentlemen, for Improvements in Rolling Metals*—Sealed October 1, 1852.

To all to whom these presents shall come, &c., &c.—Our invention consists in the employment of two or more pairs of rollers in succession, to be applied in the extension or flattening of iron, zinc, lead, tin, copper, or the alloys or combination of those metals, so as to get through more work, or to obtain a combination of the advantages of rolling and drawing, and also, in some cases, such as with sheets, the production of a flatter surface than is obtained by the ordinary methods of extension. And in carrying out our invention, we prefer to proceed in the following manner. If, for instance, we wish to extend bars of iron into thinner forms, or into rods or wire, we place in a frame two or more pairs of rollers, one pair behind the other. We drive each succeeding pair of rollers at a somewhat greater speed than the pair preceding them; and in the case of the tougher metals, such as iron and copper, the difference between the

speed of the pairs of rollers we prefer to be such, that there shall be a strain on the iron or copper between them, so as to extend it, and to assist in laying the fibres of the metal in one direction. The end of the bar, or other piece of metal, is introduced between the first or slowest pair of rollers, and, by their revolution, it is carried forward, until it reaches the succeeding pair, which, taking hold of the metal and revolving at a greater speed than the first, causes an extension of the metal, by drawing it out, as well as by compression between the rollers. When the metal, being so treated, is light, we place a bed, or guide bar, between the pairs of rollers, to guide the metal from one pair of rollers to the other. In some cases, as in the manufacture of wire, we can substitute a die for the first pair of rollers, but we consider the rollers preferable.

In the case of iron and copper, we prefer that those metals should be hot. A workman, however, will understand the temperature best suited to the metal he is operating upon (as we work at the usual temperature). By rolling out sheets through successive pairs of rollers, as thus described, we avoid the necessity of after cold rolling or flattening, which tends to harden the iron. And by the combined action of such pairs of rollers, or combining the rolling and drawing of wire as described, we are enabled to extend it at a more uniform temperature, than by rolling with one pair of rollers; we also obtain the advantage of drawing the fibres of the metals in one direction.

Although we have described this mode of proceeding which combines the advantages of rolling and drawing, we would have it understood, that we do not confine our claim to it, but that the drawing may be dispensed with, and the use of the several pairs of rollers alone retained. The rollers must be made of the materials best suited for the work they have to perform, in most cases iron will be found the best material for them.

When the object is only to flatten the surface of the sheets of metal, we use much lighter rollers for the second pair than for the first, and we work them under much less pressure than where the object is to extend the metal by drawing it out.—In witness, &c.

EDMUND MOREWOOD.
GEORGE ROGERS.

Filed April 1, 1853.

Specification of the Patent granted to Christopher Nickels, *of York-street, Lambeth, Manufacturer, and* Benjamin Burrows, *of Leicester, for Improvements in Weaving.*— Sealed September 30, 1852.

To all to whom these presents shall come, &c., &c.— Our invention has for its object, improvements in weaving carpets and such like fabrics, which require strong backs, and consists of throwing two or more shuttles through a warp at the same time in hand and power looms, and combine therewith the applying jacquard apparatus, so as to open the required sheds, above and below. And in order that our invention may be most fully understood and readily carried into effect, we will proceed to describe the means pursued by us; and in doing so, we will suppose that it is intended to weave Brussels carpets, or, in fact, any piled fabric, which requires a strong back and a piled face, or upper surface. If the piled surface is to be produced by bringing up different colours, according to a pattern, we employ jacquard apparatus for the pile warp, in order to bring up the pile warp in proper order, as is well understood; but if the piled face is to be of one colour, or if a printed warp (for the pile) is used, then, in either of these cases, a leaf of heddles is employed. Heretofore, the weft has been introduced, in such-like weaving, by two or more shoots of the same shuttle, between the succeeding pile courses; but when thick and thin weft have been employed two shuttles have been used, the thicker weft being employed to produce a thick back. We do not, therefore, claim the use of two shuttles in making such descriptions of fabrics. The peculiarity of this invention, consisting in the constructing of two shuttle boxes, one above each other, at each end of the lay or batten, combined with the opening of two sheds in such manner that the bottom of the lower shuttle box, on either side, shall range with the level of the lower shed, and the bottom of the upper shuttle boxes shall range with the bottom of the upper shed, by which the two shuttles used may be thrown across simultaneously, and it is preferred, in order to make good selvages, that the two shuttles should be thrown across in opposite directions. Supposing a printed warp is to be used for the pile, then we employ four warp beams, in which case we do not

require jacquard apparatus, and this warp is worked by a leaf of heddles, and the pile warp is placed on the upper beam. We place the linen warps on three beams, the upper beam contains one yarn for each space in the reed, and is worked so as to form the top and bottom of the upper shed, that it is alternately at the upper and lower surface of the upper shed, when the upper shuttle is alternately thrown from side to side. The next, or dandy warp, has four or other number of yarns to each space in the reed, according as it is desired to have more or less filling; this warp is worked in such manner, that it alternately forms the top and bottom of the under shed, through which the lower shuttle is thrown; the third linen warp has one yarn to each space of the reed, and is caused alternately to form the top of the upper and bottom of the lower shed, formed in the linen warps. By which arrangement it will readily be understood, that, supposing a shoot of weft from each of the two shuttles has been simultaneously thrown across when the upper linen warp is at the upper part, the dandy or filling warp in the middle, and the lower linen warp at the bottom, the next two sheds, which will be simultaneously opened in the linen warp, will be as follows, the upper warp will be caused to descend to the middle, the middle or dandy warp will be caused to descend to the bottom, and the bottom warp will ascend to the top of the top shed, when the shuttles will be again thrown simultaneously across, in opposite directions, when the several linen warps will again assume their before-mentioned positions. If wires are to be used, then a third shed is to be opened by raising the pile warp above the upper shed of the linen warp by its leaf of heddles or by jacquard apparatus, if such apparatus be used, and we prefer that such wires should have four shoots of weft thrown in between each wire, two from each shuttle; but this may be varied, and the pile warp is to be simply carried down to the middle. In order that the loom may stop, if worked by power, in the event of either of the weft threads breaking or being used up, we employ weft stoppers at each end of the reed, as is well understood, and they are simply arranged to act on the two weft threads, so that if either breaks or is expended the finger at that end will cause the loom to stop, as is well understood. At each end of the lay or batten two shuttle boxes are formed, each with a picker, as is well understood, there being a ledge or shelf projecting beyond

the box towards the warp to form the shuttle race. These shuttle boxes are similar to those in ordinary use; and we would state that we are aware that two, three, and more shuttles have before been used at each end of a batten or lay, with a view to use two or more shuttles with different coloured or different descriptions of weft, and they have been shifted to range with the sheds opened in the warp; but according to the present arrangement the two shuttle races are constructed to range with the two sheds which are simultaneously opened in the linen warps.

Although we have mentioned the use of wires for producing the pile, other arrangements which are well known, may be employed in place thereof.

What we claim is,

The combination herein described for weaving fabrics with two shuttles thrown simultaneously across in two sheds, opened in the warps to receive the same.—In witness, &c.

CHRISTOPHER NICKELS.
BENJAMIN BURROWS.

Filed March 30, 1853.

Specification of the Patent granted to ROBERT BEART, *of Godmanchester, in the County of Huntingdon, for Improvements in the Manufacture of Bricks and other Articles through Moulding Orifices.*—Sealed October 1, 1852.

To all to whom these presents shall come, &c., &c.— My invention consists,

First, of combining with the pug-mill a screen so that the clay may be forced through the screen by a piston into the pug-mill; and,

Secondly, the invention consists of causing the axis of a pug-mill to descend through the bottom, and by means of gearing below to give motion to an axis, which by racks give motion to the piston, which forces the plastic material through moulding orifices. And in order that the invention may be more fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

At the upper part of a pug-mill I affix a rectangular metal trough, the end near the pug-mill is closed in at the top, bottom, and sides, whilst the part beyond is open at the top, in order that when the piston is moved back as far as it will go in the trough, the clay or brick-earth may be introduced in front of the piston, whereby when the piston is again moved towards the pug-mill the clay or brick-earth in the trough will be forced forwards by the piston, through a grating which is fixed near that end of the trough which comes near the pug-mill, by which arrangement the clay or brick-earth thus fed into the pug-mill will be screened and rendered free from stones or roots. In order to keep the screen free and open, a cutter of the size of the screen is caused to descend through a slit or opening at the top, and behind the grating, to sever the clay just before the piston commences to move back, hence any stones or roots in the clay will go back with the piston, which I make concave, hollow on the front surface, in order that it may not come up to the grating.

By this arrangement when the piston goes back the stones and roots may be removed before the piston is again moved forward by the working of the machine.

I would remark that this construction of screening apparatus is not new, and therefore no claim is made thereto, this part of my invention consisting of combining a screening apparatus, such as above described, with a pug-mill, in order that the clay or brick-earth may in place of being fed directly into the pug-mill be fed into the trough, and forced therefrom through a screen into the pug-mill.

I will now describe the second part of my invention. Heretofore, when brick-earth has been forced from a pug-mill into suitable apparatus for moulding the clay or brick-earth, by forcing it through moulding orifices, it has been usual to give motion to the racks (which actuate the piston) from a shaft separate from the axis of the pug-mill.

Now, the second part of my invention consists of causing the axis of the pug-mill (on which the knives are placed) to descend through the bottom of the pug-mill, (in place of it resting, as heretofore, in a bearing or steps at the bottom of the pug-mill,) and to affix on such shaft or axis (below the bottom of the pug-mill) a bevilled toothed-pinion, and I cause the axis below the pinion to rest in a support or step. The pinion affixed on the pug-mill axis takes into and gives motion to a bevilled-toothed wheel on

a horizontal shaft or axis, on which is fixed part of a toothed wheel suitably arranged, as is well understood, for gearing alternately into a toothed rack above and a toothed rack below, which racks are fixed to the pistons in the apparatus, such as has heretofore been used for forcing clay or brick-earth through moulding orifices.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I make no claim to the constructing of pug-mills, nor do I claim moulding apparatus, such as have been herein mentioned, they being well known. This part of the invention consisting of giving motion to the piston of moulding apparatus, by causing the axis of the pug-mill to pass through the bottom, and to giving motion therefrom by means of a pinion to the racks which are fixed to the part of the apparatus which carries the piston of the moulding apparatus.

But what I claim is,

First, the combining a screening apparatus with a pug-mill in such manner that the clay or brick-earth in place of being fed directly into the pug-mill is fed into a trough or receiver, and is forced therefrom by a piston through a grating or screen, so as to separate the stones and roots therefrom before the clay falls into the pug-mill; and,

Secondly, I claim the constructing the axis of a pug-mill in such manner that it may descend through the bottom of the pug-mill, and by means of a pinion combined therewith give motion to a bevilled-toothed wheel on the axis, which gives motion to the racks which actuate the piston of the moulding apparatus.—In witness, &c.

ROBERT BEART.

Filed October 1, 1853.

Specification of the Patent granted to CHARLES FREDERICK BIELEFELD, *of Wellington-street North, Strand, in the County of Middlesex, for Improvements in Constructing Portable Houses and Buildings.*—Sealed October 1, 1852.

To all to whom these presents shall come, &c., &c.—This invention has for its object the construction of houses and buildings suitable for emigrants, and consists of a mode

of framing such buildings in parts or pannels which will go readily together without requiring skilled workmen. The front, back, and ends of a house or building are made up of pannels of a rectangular form framed in wood, and externally covered with iron, plain or corrugated, and by preference galvanized; and on the inside the frames or pannels are covered with papier maché, or thick paper, or wood, or other suitable materials, the space between the inner and outer coverings (excepting so much as is occupied by the framing) being air spaces, which will tend to keep the building warm. The pannels go together by means of pilasters grooved to receive them. The parts of the ground plate and framing go together in squares, and fixed to each other by screws and nuts. The floor is made in parts of a square form, the board being fixed to the joists, and the ground plate or frame is notched out to receive the joists. The upright pannels enter between the floors and a fillet fixed to the ground plate. The roof is made in rectangular parts by framing or connecting the rafters at top and bottom, so that when the parts of a roof are brought together and are placed to the proper inclination they are fixed by screws, and are retained from strutting by means of tie bars or rods. The frames or rafters are externally covered with iron (corrugated or plain), by preference galvanized; and when a horizontal ceiling is not to be used, then on the interior by papier maché, wood, or other suitable materials. The ceiling is also made in pannels. The partitions are all made in pannels, and go together by means of pilasters, in like manner to the ends, front, and back of the building. And in making partitions, it is preferred to cover the frames with papier maché on both sides, and in this manner may partitions be made for the interior of ships or vessels, but other materials may be employed for covering the framed pannels for the portable buildings.

In carrying out my said invention, the great object to be kept in view by the workman is, that the house or building shall be composed of as few main pieces as may be, and that each main piece shall be made up in the form of a pannel; and for the front, back, sides, and interior partitions each pannel is made hollow; and I prefer, in all cases, papier maché for the interior lining or surface, because it is not liable to shrink in hot climates. In the specification of a former patent granted to me, I described means of making very large sheets of papier maché, or a composition in the

nature thereof, and I prefer the use of such preparation for the interior linings of all pannels, though other linings may be used, and I prefer to place such preparation between two sheets or surfaces of strong canvas or woven fabric, as by such means the desired strength of papier maché may be obtained with much less thickness of papier maché than if the canvas be dispensed with, and the use of the canvas facilitates the fixing of the lining to the framed pannels. I find that in making portable houses, in order to have as few parts as may be, and yet be within the dimensions which can be conveniently received and stowed on board ship, that the pannels may be about twenty-one feet long and eight feet high; and I form framed openings for doors or windows in the pannels; and I find that for a small house of two rooms, say fourteen feet in length, fourteen feet deep, and eight feet six inches high, that the front and back and ends may each be formed of one pannel. Each pannel I frame together, using the sill or ground plate (by preference of oak) for the bottom of the pannel. The ends and intermediate parts of the sill or ground plate is prepared to receive the ends of the house, so that the two parts of the sill or ground plate may go together and fix with bed-screws, and also for receiving the ends of the sill or ground plate of the partition. To each sill or ground plate I fix the bottom rail, having such a series of uprights as may be necessary to give the desired strength, using diagonal framings to keep the whole strong and firm, and on the uprights I fix the top plate, all which will be well understood by a carpenter. I then apply the exterior covering, for which I usually apply galvanized sheet-iron, which I nail to the wood frame, excepting at the openings for door and windows; and at the upper parts of these plates, near the roof, I have numerous small holes for the outer air to pass fully into the interior of the hollow pannel.

I would, however, remark that the papier maché may, if well painted, be used in place of iron for the external covering of the pannels. In coating or covering the interior of the pannels, I apply, as before stated, by preference papier maché rolled between two surfaces of strong canvas, and I nail it on to the framed pannel before it is quite dry, so that, in drying, by the slight shrinkage it undergoes, it will cause it to become tight and even at all parts, more completely so than if the papier maché were first dried and then fixed; and in this state I place the whole in a drying room and

dry the papier maché, and before sending out the pannels I paint them well. At the angles I place pilasters or plates to cover the joint where two pannels come together, and fix the same by screws. In making a partition for the interior, I proceed in the same manner, excepting that I coat or cover both sides with papier maché, though other materials may be used, but I believe not with so much advantage. In making the outside doors I prefer them to be hollow, and covered on both sides, in the same way as described for the pannels, constituting the front, back, and sides. In constructing the floor, it is made in pannels of the sizes of the rooms, or in quarters, or in halves, in such manner that the end of the joists will rest on the sills or ground plates, in notches to receive them, and the joists will be combined together by nailing the boards on to them. In constructing the roof I make the parts in pannels, whether the roof be angular or curved, and I make such pannels hollow in order to facilitate ventilation, and also to keep out the sun's heat by the interposed air in the hollow pannel, and also to keep out cold by like means. If the roof is to be angular, I make two pannels, and cover them on the outside with sheets of galvanized iron, and on the underside with papier maché, and I connect the two pannels at the upper part by screws, and have a trough-like ridge to cover the joint, and I make an opening or openings through the ceiling into the hollow roof; and at the eaves or under parts, which project over the upper plate of the front and back, I make a number of openings, and in the interior I can, if desired, have means of closing the openings through the ceiling. The rafters of the roof are to be prepared, rest on, and be fixed to the top plates of the building by screws or otherwise, and the space between the inner and outer coverings of the pannels of the roof may be left more or less open at the eaves, as may be wished. When a flat ceiling is desired with an angular roof, then I have a pannel on purpose for the ceiling to fix in the roof by screws. When a curved roof is formed, then I can make it of one or more pannels in length, and of the depth of the house. If more than one pannel is used for a roof, in such case I can cover the joint with a batten or otherwise, and in such roofs I have covered with iron exteriorly and interiorly with papier maché, but both at the inside and out they may be covered with papier maché between canvas, well coating the outside with white lead and painting.

From the above description, a workman will understand that the peculiarity of the invention consists of constructing a portable house or building of a combination of pannels, formed to go together readily, the pannels being hollow, except those constituting the floor; and a workman will also readily understand that if the dimensions of the house or building is to be larger, that is, where the length or width is greater than can conveniently be shipped, if made in one pannel for each side, two or more pannels may be made as above described, and suitable to be combined by bed-screws at the sills and top plates, and the joints covered by pilasters or plates fixed by screws.—In witness, &c.

CHARLES FREDERICK BIELEFELD.

Filed April 1, 1853.

Specification of the Patent granted to JAMES HODGSON, *of Liverpool, in the County of Lancaster, Engineer and Iron Ship Builder, for Improvements in Constructing Iron Ships and Vessels.*—Sealed October 1, 1852.

To all to whom these presents shall come, &c., &c.—Heretofore in constructing iron ships and vessels it has been usual to employ angle iron to make the ribs or framing of the ship or vessel and to affix thereto sheet iron.

Now my invention consists of dispensing with the use of ribs and beams and obtaining the desired strength by the simple use of sheet iron rivetted together in like manner to that pursued in boiler making. In applying bulk heads in such ships or vessels they are fixed to horizontal plates rivetted to the interior of the body of the vessel. The decks are made of sheet iron, and the gunwales formed without beams, and wood decks are fixed thereto. And in order that my invention may be more fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

In constructing a ship or vessel according to my invention, in place of constructing a frame of angle iron such as has heretofore been constructed to receive and have fixed thereto the plates of sheet iron, I cause a temporary frame to be constructed to the form which it is intended to give the ship or vessel, the object of which is simply to facilitate

the getting the sheets cut, bent, and punched to the correct forms, the temporary frame simply acting as a template or pattern of the intended ship or vessel, and in place of fixing the plates of iron to the frame and thus combine them as heretofore, I cause the plates of metal to be simply rivetted to each other as is practised in boiler making. The temporary frame I prefer to be of bars of iron, but wood may be employed, or both wood and iron. In making the sheet iron for this purpose I prefer to have the sheets stouter than would be used if angle iron frames were also employed and combined therewith, and I recommend as much additional weight should be given to the plates as the angle iron would amount to, thus using in a ship or vessel as much weight of iron as at present, but distributed more evenly by reason of the whole of the iron being in the form of plates, by which a much stronger ship or vessel will be obtained than when using a frame of angle iron, clothed with sheet iron, but the weight or strength of plates as heretofore must be left to the ship builder, and he will judge what is best for the particular ship he is about to build, taking into consideration the nature of the trade the ship or vessel is to be engaged in, and other circumstances which are necessary as heretofore to be considered. In constructing the decks I dispense with the beams and build the same of sheet iron plates rivetted together and to the sides of the ship, but I prefer to give the decks somewhat more curve than is usual, and I fix wood plankingly on to such decks by means of screw bolts and nuts which bolts pass through the planking and through holes formed in the plates of which the deck is composed, and the same are secured by nuts. Between the planking I caulk the joints as usual. In fixing bulk heads in ships or vessels in place of tending to weaken a ship or vessel as heretofore at those parts, I so fix them as to increase the strength at those parts, and for this purpose in place of angle iron which is fixed to the outer shell of the ship or vessel (and to the bulk head) by rows or lines of rivets running in the direction and near to the bulk head, I cause the plates near which a bulk head is to come, to be made double for a considerable extent of their length by riveting on to such plates other or lining plates, taking care that the rivets by which these lining plates are affixed are not in regular lines in a manner to weaken the plates of the outer shell to which they are

riveted. To these lining sheets I previously fix angle iron, by riveting or welding, to receive and have fixed thereto the plates of iron which are to compose the bulk head, by these means the rivets which fix a bulk head to the outer shell of the vessel will be distributed over an extended space and the line of rivets by which the angle iron is fixed to the inner or lining plates will not interfere with the outer shell of the ship or vessel, on the contrary it will be wholly received and borne by the inner or lining plates, and the whole will be more sound and tend to give strength rather than to weaken the outer shell of the ship or vessel.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that what I claim is the mode herein described of combining and constructing parts of ships or vessels by employing sheet iron riveted together.—In witness, &c.

JAMES HODGSON.

Filed April 1, 1853.

Specification of the Patent granted to RICHARD WHYTOCK, *of Green Park, Zibberton, in the County of Midlothian, for Improvements in the Manufacture of Fringes and of Pleats for these and other Ornamental Work.*—Sealed October 1, 1852.

To all to whom these presents shall come, &c., &c.—This invention consists of manufacturing fringes or parts of fringes and other ornamental work by employing printed or parti-coloured warps in warp-lace machinery; and in order that my invention may be most fully understood I will proceed to describe the means pursued by me.

This new fringe I have termed the tressal or tressel fringe is made of parti-coloured threads or yarns and is formed or manufactured of such in warp-lace machines, and I would remark that the term "pleat" in the title, I apply to the looped cords if made in separate strands instead of their being made and connected together in the form of fringe in the same machine; either with the view of their being used as ornamental braid or of their being afterwards made into fringe in ordinary fringe looms. Those pleats, as I have termed them, con-

sist of two or more printed or parti-coloured threads previously coloured alike, or nearly alike, interlaced or looped together on the principle of double crochet.

The following are the means on which I propose to make this "tressel fringe," or three separate pleats or strands. A printed or parti-coloured warp is prepared, as is well understood, of as many threads or strands as the machine will admit of, say 500 pairs of threads; these threads are placed in guides of the machine as if about to make looped lace therein, and when a narrow and nearly close band has been formed with all the threads across the machine to bind them altogether in their order, the formation of the fringe or separate cords proceeds by each pair of threads being simply interlooped or interlaced together so as to form one cord of the fringe. Farther, each pair is coloured so as that a regular pattern will be secured whenever the threads are placed in order, and formed into cords hanging side by side. When the workman has formed these cords or plaits separately from each other, yet in close order, say to the depth of five, six, or more inches, according to the depth intended for the fringe, he then weaves another band, like what he commenced with and this second connecting band forms the head of the next row of fringe. In this way the process goes on until he has exhausted his warp of parti-coloured yarn and formed a web of plaited cords bound at intervals of so many inches by cross bands. The web thus formed is hard rolled upon another beam and subjected to a steaming process to make the pleats or cords keep their perfect form. The sections of the fringe then are separated by cutting the lower ends of each section from the upper edge of the next band. If the frame is two yards wide the fringe will consist of lengths of two yards each and these are afterwards joined together with a needle, or otherwise, and if desirable an ornamental gimp or band is plaited on the head formed as above described in the warp machine. This additional head of gimp or other lace might be introduced along with the weaving of those cords in the fringe looms, that is supposing the cords or pleats are first formed in the lace frame, but the best way is to form the fringe as above described in the same frame that makes the cords, and any regular patterns may thus be produced instead of fringes that have been usually made quite plain.

I make no claim for the invention of the warp lace frame

nor the parti-coloured warp as a new invention, and I am aware that looped lace fabrics have before been made with printed or parti-coloured warps in warp lace machines, I do not therefore claim the same.

But what I claim is, the manufacture of fringes or parts of fringes of printed or parti-coloured warps by looping them in warp-lace machines as herein described.—In witness, &c.

Richard Whytock.

Filed April 1, 1853.

Specification of the Patent granted to Alfred Trueman, *of Swansea, in the County of Glamorgan, Manager of Copper Smelting Works, for Improvements in obtaining Copper and other Metals from Ores or Matters containing them.*—Sealed October 7, 1852.

To all to whom these presents shall come, &c., &c.—This invention consists of acting on oxide ores (or sulphuret ores, after they are reduced to oxides by calcination), by digesting them in acids, and afterwards applying muriate of lime and lime.

If sulphuric acid be used the copper alone will be dissolved, and it is to be drawn off, leaving sulphate of silver, which is to be washed out by hot water, and added to the sulphate of copper, previously run off. Common salt, or muriatic acid, to be added to this solution, to throw down the silver, as chloride; the solution of sulphate of copper is to be run off, and muriate of lime added to it, forming muriate of copper and sulphate of lime precipitated; the muriate of copper to be run off, and lime added to it, to throw down oxide of copper, leaving muriate of lime in solution, which is to be again used for the previous process. The oxide of copper and chloride of silver to be treated in the usual way to obtain the metals.

The residue in the first tanks, after the copper and silver solutions have been drawn off, is to be boiled in a solution of caustic alkali to extract the oxide of tin, which may be obtained from the caustic solution, by various means; or the residue may be smelted in the usual way, to obtain metallic tin.

If muriatic acid be used the copper alone will be dissolved

out, and may be, at once, treated with muriate of lime and lime, as before stated; the chloride of silver left in the first tank to be dissolved out by a hot solution of common salt, or of hyposulphite of lime, from which the silver may be obtained, by various means. The residue to be treated as before.

If nitric acid be used both silver and copper will be dissolved, the silver may be obtained by the addition of salt, or muriatic acid, as from the sulphate of copper solution. The copper to be thrown down from the solution by soda or potash, forming a solution of nitrate of the substance used, the solution may be evaporated to obtain crystals.

The residue, in the first tanks, to be treated as before.

I propose to treat some of the slags obtained in the methods of copper smelting, now in use, in a similar manner, that is, by digesting in acid.

Also carbonates of copper may be treated in the same manner, with or without calcination, that only being necessary when other metals are present, which it is desirable to separate from the copper, by the calcination; some will be peroxidized, and rendered less soluble in acid, and others will be driven off.

Two or more acids may be used together, the after treatment being varied accordingly. And in order that my said invention may be more fully understood, I will proceed to describe the means pursued by me.

Treatment of Sulphuret Ores.

The ore is to be ground to fine powder, and calcined at a gradually increasing heat for about twenty-four hours, in order to drive off the sulphur, the last six hours the heat should be increased to and kept at a good red, which will have the effect of peroxidizing the iron and any tin that may be in the ore, the sulphur should be driven off as nearly as possible, and also the arsenic and antimony, if there be any in the ore. In some cases it may be found necessary, or convenient, to partially calcine the ore before grinding to powder, in which (partially calcined) state it is more easily ground; and, after grinding, may be again calcined, to finish the operation. After the calcination is completed, the ore is to be removed to tubs, or vats, or other suitable vessels, and acid added in proportion to the quantity of copper and other metals to be acted on contained in the ore, the proportions are to consist of one equivalent of acid to one of

copper in the ore, and an additional quantity of acid to act on the silver, if any in the ore. Water is then to be added to the ore and acid in the vessel, so as to make an equal or greater weight of water and acid as there is of ore, the whole to be boiled, and well stirred during the operation. The boiling should be continued during several hours, at the end of which time the ore may be allowed to settle, and the supernatant solution drawn off into a tank, No. 1; and then fresh water added to the ore to wash out all the copper, which washings may be added to the solution first drawn off.

If sulphuric acid has been used for acting on the ore, the water used for washing is to be hot; if it is desired to obtain any silver in the ore by the use of hot water, the sulphate of silver previously formed will be dissolved, and this solution may be added to the first portion drawn off, to which must then be added a muriate (common salt, or muriatic acid, are the most suitable), sufficient to precipitate all the silver, which may be allowed to remain at the bottom of the tank till a considerable quantity has accumulated; the solution then containing copper, and perhaps a little iron, is to be drawn off into another tank, No. 2, and chloride of calcium added, which will throw down sulphate of lime, leaving chloride of copper, which is to be drawn off into another tank, No. 3, and milk of lime added to it, to throw down the copper as oxychloride; the solution and precipitate in this tank should then be well boiled, to concentrate the precipitate, the liquor may then be drawn off, and used for the previous operation. The precipitate of oxychloride of copper may accumulate in the bottom of the tank till a foot or more in thickness, it should then be removed and dried, and fused with carbon to obtain metallic copper. The chloride of silver in No. 1 tank, when a sufficient quantity has accumulated, may be treated in the usual way, to obtain metallic silver.

If, after boiling the ore with acid in the first vessel and washing with water, copper should then remain in the residue, a further quantity of acid must be added, and the boiling repeated; when all the copper has been obtained, the residue, if containing tin, is to be washed with water, allowing of the particles to arrange themselves, according to specific gravity; the oxide of tin being heavier, may thus be obtained nearly free from oxide of iron and earthy matters, and may be reduced by carbon, in the usual manner.

The residue in the first vessels may be treated with a strong solution of caustic alkali, which will dissolve out the oxide of tin, which may be obtained from the solution, by the addition of a large quantity of water.

This treatment, or that of washing, so as to arrange the particles according to their specific gravities, may be used.

The acid I prefer to use is muriatic, which may be used in the following way:—If silver is in the ore the acid should be sufficiently dilute to prevent the chloride formed being dissolved, as it should remain in the first vessel, with the residue. The chloride of copper, formed at the first boiling and washing of the ore, after being run into No. 1 tank, may have milk of lime added at once, and after boiling in this tank, the solution of chloride of calcium may be allowed to run to waste, or if found of commercial value, may be crystallized. The precipitate of oxichloride is to be treated as before directed. The residue in the first vessel, if containing silver, is then to be treated with a hot solution of common salt, or hyposulphites of lime, or soda. I prefer the latter salts, from which, after being drawn off into another tank, the silver may be precipitated, by placing in the solution pieces of iron, or other suitable metal. The residue may now be treated as before for tin. Nitric acid may be used, as well as either of the former acids, with the solution of copper, which is to be precipitated by pot-ash or soda, which solution being drawn off, from the precipitated oxide of copper, is to be evaporated and crystallized, to obtain nitrate of soda or pot-ash.

As the silver will have been dissolved in the first vessel by use of pure nitric acid it is advisable to use a very little muriatic acid, mixed with the nitric, which will cause the silver to remain in the first vessel with the residue, which is to be treated as directed, when muriatic acid has been used.

The slags produced by the present methods of copper-smelting, I propose to treat in the same way as ore if containing other metal that it is desirable to obtain. The slag is to be ground to a fine powder, and calcined, the same as the ore, to oxidize the various metals contained; the subsequent treatment will be the same as with ore.

Carbonates and oxides of copper may be treated in the same way, either with or without calcination, that only being necessary when other metals besides copper are contained in the ore, and which it is desirable to separate.

Although I have proposed to separate the chloride of

silver from the residue by a solution of common salt, or of hyposulphite of lime, or soda, the separation may also be effected by mercury, as is well known.

Also, the copper may be precipitated from its solutions by the insertion of another metal, as iron or zinc.

Having thus described the nature of my said invention, and the manner of performing the same, I would remark, that I am aware that acid has before been used to separate small quantities of copper from tin ores, I do not, therefore, claim the same; and I wish it to be understood, that what I claim is, the mode herein described of separating copper from copper ores and slags; and I also claim the application of earthy and alkaline hyposulphites, for dissolving chloride of silver.—In witness, &c.,

ALFRED TRUEMAN.

Filed April 7, 1853.

Specification of the Patent granted to CHARLES BILLSON, *of Leicester, Manufacturer, and* CALEB BEDELLS, *of Leicester aforesaid, Manufacturer, for Improvements in the Manufacture of Articles of Dress where Looped Fabrics are used, and in Preparing Looped Fabrics for making Articles of Dress, and parts of Garments.*—Sealed September 30, 1852.

To all to whom these presents shall come, &c., &c.—Our invention consists,

First, of making polka and other jackets, or dresses, by combining non-elastic materials for the fronts, and elastic or looped fabrics for the backs.

Secondly, our invention consists of cementing vulcanized india rubber between surfaces of looped fabric.

Thirdly, our invention consists of cementing fibres or yarns endwise, on an elastic back, composed of vulcanized india rubber or looped fabrics, so as to produce elastic plush.

And in order that our invention may be most fully understood, and readily carried into effect, we will proceed to describe the means pursued by us.

In carrying out the first part of our invention, we combine non-elastic on looped fabrics, in making up polka and other jackets or dresses in the following manner:—The jacket, or

other form of dress, is made up in the ordinary form, using looped fabrics, which are, as is well known, elastic, and into the front parts of each of such jackets or dresses, the two fronts of a waistcoat, of non-elastic fabric, that is, fabrics woven with warp and wefts, are sewn, by which combination very useful dresses are produced, the first parts of the jackets coming beyond the parts where the fronts of the waistcoats are sewn.

In carrying out the second part of our invention, we prefer to employ very fine warp fabrics of silk (though others may be used), as by such means very thin elastic fabrics, composed of two surfaces of warp fabric, with vulcanized india rubber, may be obtained; and in order to combine the vulcanized india rubber with the two surfaces of looped fabrics, we fasten each fabric to a square frame of wood, so as to keep them distended evenly, and in order to coat one side of each fabric, we place the frame over a marble or other suitable slab, the frame of wood being large enough to allow the fabric to lie on the slab. A trough of india rubber cement is then brought to the surface and spread out and tilted, so that the cement may fall on to the fabric near one edge of the frame, and the trough is to be moved carefully over the fabric, delivering the cement on to the surface thereof, the under edge of the trough resting on the fabric acts as a doctor, and only allows a thin film of the cement to remain on the surface of the fabric, and in this manner the two frames of fabrics are to be prepared, which are to be cemented together. The sheet of vulcanized india rubber, to be used between such fabrics, is to be fixed in a frame, and very slightly distended, in order to get it even in all parts, india rubber cement is then applied by a brush to both surfaces, which will cause it to bag, and become very unequal; but after a time, on being hung up, it becomes even, and when taken from the frame will retain an even character, and may be cut up into the forms desired, and as it is desired, in most cases, that the vulcanized india rubber should be inclosed between the two surfaces of looped fabrics in such manner, that the two looped fabrics should extend beyond the vulcanized india rubber all round, and thus be allowed to come in contact with each other; and as it is desirable that this should be done regularly, and not cause waste, particularly where a large number of pieces of vulcanized india rubber are to be shut in between two sheets of looped fabrics, we find it

desirable to employ what we call moulds, which are surfaces of wood, having recesses formed therein, of the forms of the pieces of vulcanized india rubber, by which it will readily be understood that the several pieces of vulcanized india rubber may each be laid into a recess in the surface of wood, which is of the size of the frame, having the fabrics thereon, and thus, when the cemented side of the looped fabric is placed down on to the surface wherein the pieces of vulcanized india rubber are, and pressed thereon, the india rubber cement will adhere, but the same will not adhere to the wood by reason of the cement on the fabric having been allowed to stand for some time. By this arrangement the pieces of vulcanized india rubber will adhere to the surface of the looped fabric, and thus may be removed from the moulds, and then, by bringing the other frame of fabric in contact with the pieces of vulcanized india rubber and the first-mentioned fabric, and by pressing them they will adhere together, and become, as it were, one fabric; the pieces of vulcanized india rubber being inclosed, and at intervals apart, according to the margin it is desired to retain when the compound fabric is cut up for its purposes. In some cases it is desirable to strengthen these margins of fabric, and to make them non-elastic at those parts, particularly where they have to be sewed to other parts of dress or garments; in these cases portions of strong linen, or other fabric, of the form and size desired, are laid in the moulds with the pieces of vulcanized india rubber, and therefore are cemented between the two looped fabrics, which, when the article is made, form the two outer surfaces, and by reason of such two outer surfaces being of looped fabrics, and having vulcanized india rubber within such pieces, will be permanently elastic, excepting at those parts where non-elastic fabrics are introduced. If it be desired to give to these elastic fabrics an embossed character, this may be done by vulcanizing the sheet india rubber in moulds of the desired pattern, or the sheet vulcanized india rubber may be cut out in pattern, or the compound elastic fabric above described may be cut out in pattern, and inclosed between surfaces of looped fabrics, as above explained.

We will now describe the third part of our invention, which consists of employing looped fabrics in place of non-elastic fabrics when making piled fabrics, by causing the ends of yarns, or fibres, to adhere thereto. The manufacture of piled fabrics, by the employment of yarns, or fibres,

laid parallel and packed together in such manner as to leave slices, cut from the ends, being well known and understood, it will not be necessary to enter into a description thereof; but heretofore, in making such articles, the fabrics used have been inelastic, and this part of our invention consists of employing loop fabrics, which are elastic, either after having vulcanized india rubber, inclosed between two surfaces thereof, as above explained, cemented to the ends of the fibres before a slice or surface is cut off thereof, and this is the manufacture we prefer; but looped fabrics may be used and cemented to the ends of fibres, or yarns, without having incorporated therein vulcanized india rubber. Having thus described the nature of our invention, we would have it understood, that we do not confine ourselves to the details herein given, so long as the peculiar character of any part of our invention be retained.

But what we claim is,

First, the combining non-elastic and elastic fibres in making up jackets and dresses, as herein explained.

Secondly, we claim the combining of vulcanized india rubber with looped fabrics, as herein described.

And thirdly, we claim the mode herein described of making piled fabrics.—In witness, &c.

CHARLES BILLSON.
CALEB BEDELLS.

Enrolled March 30, 1853.

Specification of the Patent granted to JOHN BLAIR, *of Duciebridge Mill, Manchester, in the County of Lancaster, for Certain Improvements in the Manufacture of Waddings, and in the Machinery for making the same.*—Sealed October 7, 1852.

To all to whom these presents shall come, &c., &c.—In order to make my invention better understood I shall,

First, state what wadding is made from. I shall,

Secondly, describe the nature and construction of an ordinary wadding. I shall,

Thirdly, describe a wadding which is made by machinery invented by Peter Armand Lecompte de Fontainmoreau, and for which a patent was granted to him, bearing date at Westminster the 28th day of February, 1846.

Fourthly, I shall describe a wadding invented by Edward Westhead, for which a patent was granted to him, bearing date the 3d of September, 1849; and

Lastly, I shall describe my own invention.

Wadding is and has been generally manufactured from cotton, but it can also be made from wool, silk, or other fibrous material. In the common, or what is termed "Sheet wadding," the cotton undergoes, as in all other waddings, the process of carding in an engine or machine made expressly for the purpose of carding cotton; and as the material comes from that engine or machine in layers or slivers similar to a very thin web, a number thereof laid upon each other by means of a small revolving drum will constitute a lap. When this lap is taken off the drum and glazed or sized on one side, by means of a brush and size made from a solution of alum and buffalo-hide boiled down and then dried, the wadding is complete. The common wadding is very limited in length, scarcely ever exceeding one and a-half yard, but never exceeding two yards. From the limited length and peculiar unevenness of its edges, this class of wadding was subject to great waste in its use, and hence it was to obviate this waste that Peter Armand Lecompte de Fontainmoreau conceived his invention for making wadding in more useful lengths.

The machinery invented by the said Peter Armand Lecompte de Fontainmoreau is capable of making waddings of unlimited length, but this capability is considered of no practical use beyond the limits of six and twelve yards, these lengths being considered more convenient for both sale and use, inasmuch as consumers usually purchase waddings by the dozen yards, and the practice, therefore, of cutting the wadding in lengths of six and twelve yards, and making them up in packages of twelve yards each has been and still is invariably followed by all manufacturers of wadding by machinery upon Peter Armand Lecompte de Fontainmoreau's principle. To effect the manufacture of unlimited lengths or of the lengths of six end twelve yards by Peter Armand Lecompte de Fontainmoreau's invention, the maker is obliged to have a number of carding engines working together and connected with each other, the precise number of which depends entirely on the substance or thickness of which the wadding to be produced is required, each engine being capable of adding only a single sliver or thin web to the formation of the lap. Thus, if wadding of

twenty layers or slivers in thickness be required, twenty carding engines will be necessary to make the same, and all of which carding engines must be connected and work together, and each deposit a sliver towards the formation of the lap. Now the manufacture of this article by the use of Peter Armand Lecompte de Fontainmoreau's invention is not only very expensive and complicated, from the fact of so many carding engines being requisite to the formation of a single lap, but is also subject to inconvenience, such as the following:—

For instance. Should any one of the twenty carding engines require new clothing or covering, or that any slight accident should arise to any one thereof while the manufacturer is in process of making laps of twenty slivers in thickness for some urgent occasion, and having at hand no other engine save the twenty in use, the whole must cease working until the carding engine is covered, or the slight accident repaired. Thus nineteen out of the twenty carding engines are left idle by the mere fact of one getting the least out of order. It is to remedy this evil that part of my invention is appropriated.

Edward Westhead's invention, for which a patent was granted to him, consists altogether of improvements in the wadding itself, which improvement is effected by the introduction of a series of threads or thin fabric, either into or upon the back or foundation of the wadding, with a view of strengthening it. His invention also extends to an improvement arising from the use of a thin solution of gutta percha instead of the size or ordinary glazing material, also with a view of strengthening the wadding.

Having fully described the common or sheet wadding, the machinery invented by Peter Armand Lecompte de Fontainmoreau for the purpose of making waddings in the more useful lengths of six and twelve yards, and Edward Westhead's invention, I shall now proceed to explain the nature of my invention, which consists,

First, of improvements in the machinery for making waddings in those useful lengths whereby much trouble, expense, and inconvenience are saved, from the fact of only one carding engine being used instead of twenty; and

Secondly, of improvements in waddings. These latter improvements are of two sorts:—first, an improvement effected by the introduction of silk into the body of the wadding, or upon the front or back, or upon both front and

back thereof. This improvement will render the waddings peculiarly strong and lasting, owing to the length of the silk staple. Second, the waterproofing of waddings intended for padding exterior garments. My improvements in the machinery are also of two sorts, by either of which I can produce the desired lengths of six and twelve yards, or even greater lengths if requisite. By my invention a lap or wadding of twenty slivers' thickness, and even of greater substance, and of six or twelve yards in length, can be produced by the aid of a large drum or cylinder, which will supply the place of nineteen out of the twenty carding engines requisite to produce a lap upon Peter Armand Lecompte de Fontainmoreau's principle. This drum or large cylinder is staked upon a shaft which revolves in brass steps or sockets, and is placed in front of the carding engine close to the doffer thereof, leaving only space for a roller of about three inches in diameter to revolve between. The cotton, as it leaves the doffer of the engine, will pass either over or under the roller aforesaid, and thence around the drum, which is to be about seventy-two inches in diameter, in order to produce a lap of six yards in length; and of double that diameter, in order to produce a lap or wadding of twelve yards in length. The drum is allowed to make revolutions sufficient to make a lap of the required thickness. Thus, if a lap of twenty layers or slivers' thickness be required, the drum or large cylinder is allowed to revolve twenty times and the lap is produced, that is, the drum is allowed to make one revolution for each layer of thickness of which the lap is required to consist. The drum being covered with woollen felt the cotton as it leaves the carding engine will adhere with such tenacity, that a lap of almost unlimited thickness can be produced. The lap when complete is taken off the drum while making its ordinary revolutions upon a rod revolving in the hand, and is then opened out and spread upon a table to be sized. This table is also of my invention. There is along its centre a slit or opening, of size sufficient to receive a long rod which will fill up the slit or opening, and consequently make the surface of the table even, upon this rod (of which there are many) the wadding is removed after being sized by hand on the table to the drying stove where it is hung longitudinally as it is taken off the table. The longitudinal drying is of decided advantage to the wadding, as its own weight combined with that of the size causes it to

expand and become broader which is of great utility for cloak-making and many other purposes. Another mode of drying and sizing the wadding, and a quicker method, is by removing the lap off the drum upon a roller which is constructed to revolve in sockets in a frame similar in make to that used for waterproofing cloths. The lap will be carried from this roller upon a short creeper so as to meet two large smooth rollers between which the lap will pass, the size is put on by hand as the lap meets these two rollers, which are so close together as not to permit any unnecessary quantity of the size to adhere to the wadding. As the lap passes between the two rollers aforesaid, it is met by an endless creeper, which is moving at a very slow pace and carries the wet sized lap into an opening or small space between two steam chests placed one over the other and leaving the space between only sufficient for the lap to pass without the back or top thereof touching the upper steam chest. My object in having the two steam chests placed over each other is because one steam chest would not have the desired effect of drying. The wadding face being of fibrous material, the heat it would receive in its passage over one steam chest would not be sufficient to dry the back which is sized, but the two steam chests being placed over each other will afford quite sufficient heat to dry the wadding in its passage between them; after the wadding has been dried in its passage between the steam chests it is carried by the creeper to the other end of the frame, where it is received by another roller in precisely the same manner as cloth is received after it has been waterproofed. I may observe that two steam chests have never been used by any person whatever for drying wadding, nor have they been placed in the positions stated for any purpose.

Another mode of making wadding in the useful lengths is by the aid of two creepers in place or stead of the large drum or cylinder. These creepers are in make similar to the creeper now in use for feeding an ordinary blowing machine with cotton and being endless and placed one over the other upon rollers will keep revolving by means of steam power. The cotton as it leaves the carding engine in slivers will pass around the top creeper and in order to protect it from breaking as it passes around and gets heavier by the additional slivers meeting it the under creeper keeps also revolving at the same speed and prevents

the lap from hanging down and breaking. The lap being taken off the creeper in the same way as off the drum, it is sized in either of the ways hereinbefore mentioned. These inventions of mine completely do away with the necessity of employing nineteen out of the twenty carding engines requisite to produce a lap of that substance by Fontainmoreau's invention, and consequently does away with all inconveniences arising from those engines being worked in connexion with each other. It may be as well here to mention that for the manufacture of an ordinary or common sheet wadding a small drum or cylinder was requisite, but it was never considered that the web or slivers as they come from the carding engine would adhere to a drum of greater diameter than about two feet, and those drums were usually covered with leather, but never with felt. I therefore claim as part of my invention all drums from two feet in diameter constructed for the purpose of manufacturing waddings. I also claim the sole invention of the application of the felt to the drums, as also the creepers.

The second part of my invention consists of the introduction of silk noils, or raw silk waste, into the wadding with the view of strengthening it. This can be accomplished in various ways. Thus, if it should be desirable to introduce a body of silk into the centre of the wadding it will be only necessary for the carder after a sufficient number of layers of cotton have been sent around the drum to supply the carding engine with silk instead of cotton, and when two or three layers of silk have gone around the drum supply the engine again with cotton. If it should be desirable to back or front the wadding, or both back and front the wadding with silk, this can be done by first supplying the engine with silk and then with cotton, and for both front and back, supply the engine first with silk, then with cotton, and then with silk, this latter mode will make a beautiful article and one which will be greatly in demand for ladies' garments owing to its peculiar softness and strength arising from the length of the silk staple. Another mode of backing or fronting the wadding is by having one carding engine exclusively devoted to making thin silk laps which can by any practical maker of wadding be attached to the cotton lap before the sizing process has been done. Wadding also from pure silk can be manufactured in the same manner as from cotton, and will be an article of exquisite softness combined with strength and

durability, and being manufactured from the waste of silk can be made at the same expense of cotton waddings. Waddings, I may observe, have never been made from silk, nor have they ever been made by any person before me of a union of cotton and silk. I therefore claim the improvement in waddings as my exclusive and sole invention, as well as all waddings, whether cotton, wool, or silk, or other fibrous material made upon drums or large cylinders greater in circumference than those heretofore in use for the manufacture of waddings of the ordinary or common lengths of one and a half and two yards. Part of my improvements in wadding is the waterproofing thereof for padding exterior garments, for boiler felting, and for other purposes. This is effected by the cotton lap being taken off the drum or creeper upon a roller made to fit in the sockets of a waterproofing frame or sizing frame, the lap passes over a creeper between two smooth rollers and from thence is carried by another creeper between two steam chests where it is dried in the same manner as I have hereinbefore described in my second mode of sizing and drying. The only difference being that to waterproof the lap a thin solution of india-rubber and turpentine or naphtha is used instead of the ordinary size.

This concludes my invention. I therefore claim the improvements stated in the machinery for manufacturing waddings, namely the drum of extended size and its covering with felt as hereinbefore mentioned; the creepers, the removal of the lap off the drum and creeper by rods, the table with the slit or opening in the centre and the longitudinal drying as my sole invention. In my improvements in the wadding itself I claim the introduction of silk into waddings in any manner either made entirely from silk or from a union of silk with any other material. I claim the drying of waddings between steam chests and the application of india-rubber for the purpose of waterproofing the waddings as my sole invention.—In witness, &c.

JOHN BLAIR.

Filed April 7, 1853.

Specification of the Patent granted to MOSES POOLE, *of the Patent Office, London, Gentleman, for Improvements in Combining Caoutchouc with other Matters.*—(Communication.)—Sealed September 18, 1852.

To all to whom these presents shall come, &c., &c.—This invention is communicated to me by Mr. Goodyear, of America, and consists of combining caoutchouc with a product of coal tar, obtained by boiling, and causing such combination to be acted on by heat (of a high degree), and sulphur, or products of sulphur. And in order that the invention may be most fully understood, and readily carried into effect, I will proceed to describe the process, as practised by the inventor. I would, however, at the outset, remark, that I make no claim to the application of heat to caoutchouc, combined with sulphur, when the product of coal tar herein described, or of the vegetable, or mineral pitch, is not combined therewith, and I would also state that I am aware that vegetable and mineral pitch, or bitumen, have before been proposed to be used in combination with caoutchouc, sulphur, and heat, but, I believe, with no success.

The product of coal tar, or of vegetable or mineral pitch, used in carrying out this invention, is obtained by boiling the coal tar (which is produced in the manufacture of coal gas), for two-and-a-half to three hours, or until it is little less hard than resin, and about the consistence of Burgundy pitch. By this process of boiling, the aqueous and gaseous matters are driven off, so that the residuum is divested of its adhesiveness, and may be worked with the same, or nearly the same, facility as caoutchouc, without adhering to the machinery. This product of coal tar may be used in large proportions with caoutchouc, and thus produce an extensive saving in the production of what is known as Vulcanized India-rubber, as well, also, in the production of hard substances, in the character of horn and whalebone, and such manufactures may have combined therewith white lead and colouring matters, as have heretofore been used in the manufactures above mentioned. This product of coal tar may be used in large proportions, particularly in coating coarse fabrics, such as substitutes for tarpaulins, as much as two parts of the coal tar product to one part of caoutchouc, and these matters are to be ground or masticated together, in

to the process of printing and dyeing when the extracted colouring matter of madder is employed. And in carrying out this, my said invention, I employ one of the following modes:—A, I cause the nitrogenous matter to combine with the cotton or fibrous material to be subsequently dyed or printed with madder colours, B, or I cause the nitrogenous matter to combine with the colouring matter of madder to be subsequently employed in dying or printing the cotton, A; in the first case I impregnate the cotton to be dyed or printed with madder in milk, from which the cream has been removed, diluted with about eight times its bulk of water, and I then dry it thoroughly, *a*. The cloth so treated may be uniformly covered by a mordant, (iron or alumina,) and when thus prepared it may be used.

First, for receiving an uniform tint or colour by dyeing with the extracted colouring matter of madder.

Second, or it may be printed in different forms or figures with the extracted colouring-matter of madder mixed with some "thickener" or vehicle, and the printed colour fixed by steaming, as is well understood; *b*, or the cloth, so prepared, may be printed in definite forms or figures.

First, by printing the usual madder mordants and dyeing in extract of madder, as is well understood.

Second, or by printing the extracted colouring-matter of madder mixed with a mordant, (a salt of iron or alumina or a mixture of the two,) together with a "thickener" or vehicle, and steaming to fix the colour so printed, B. In the second case I cause the nitrogenous matter to combine or be mixed with the extracted colouring-matter of madder before being used for dyeing or printing, either by the simple addition of one to the other, or by intimately combining or blending them in the following manner:—The colouring-matter of madder is dissolved in an alkali, say, ammonia, and to this solution I add a solution of the nitrogenous matter, milk, soluble albumen, or one of the protein compounds dissolved in an alkali. The mixed solution is precipitated by an acid, and I wash the precipitate. The precipitate which contains the nitrogenous and colouring-matters in a state of intimate union may be employed.

First, as a topical colour upon cloth, impregnated with a mordant steaming to fix the printed colour, as is well understood.

Second, as a topical colour upon unprepared cloth, a mordant being mixed with the colour before printing.

Third, or the nitrogenous colouring-matter may be used in the "dye-beck" in the ordinary way to dye cotton, padded or printed with the usual madder mordants. In the first case I prefer to use a large proportion of nitrogenous matter. To one part of pure colouring-matter I add about one hundred of skimmed milk and precipitate the mixture by an acid. The mixed mass of casein and colouring-matter then only requires washing, and the addition of a small quantity of alkali to be ready for printing, the casein partially dissolved by the alkali acting as the "thickener" or vehicle. Or the casein or other protein compound may be first made into a mucilage by an alkali, and the colouring-matter be then added to the thickened mass. In cases two and three a minute quantity of nitrogenous matter is sufficient to produce marked results; I usually, however, employ about one-fifth of the quantity of casein indicated above, viz., to one part of colouring-matter the casein from twenty parts of skimmed milk or other protein compound in a state of solution.—In witness, &c.

JOHN ROBERT JOHNSON.

Recorded April 2, 1853.

Specification of the Patent granted to JOHN FREDERICK CHATWIN, *of Birmingham, in the County of Warwick, for Improvements in the Manufacture of Brushes.*— Sealed October 6, 1852.

To all to whom these presents shall come, &c., &c.— This invention consists of causing the bristles or other points employed to be first woven at one end into a fabric, and then fastening the woven ends into or on suitable handles whereby the bristles or other points will be more securely held. And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

I employ a warp of linen or of other yarn or thread of a width suitable for the length of bristles or other points

used, say, of a width, such as has been heretofore resorted to for binding like lengths of bristles on to a handle, and having placed such warps in a loom, I by treadles cause sheds to be opened, as is well understood, and in place of throwing a shuttle weft through sheds, I introduce bristles, a few into each shed, taking care that the stronger ends of the bristles are all one way, and that the stronger end of each bristle comes just beyond the selvage at one edge, the other ends of the bristles extending beyond the other edge or selvage of the woven fabric; a distance depending on the length of play it is intended to give to the bristles beyond the point at which they are fixed in the woven fabric. Where the material is long, such as whalebone, I prefer to have the warp spaced, leaving intervals equal to the length of points it is desired to have beyond the part where the points are to be bound or fixed when making a brush.

When the fabric is woven it is to be cut into parts, or the spaces between the warps may be sufficient in some cases for two lengths of the protruding points beyond where they are bound or woven into the fabric, in which case they would be cut into parts intermediate of the two weavings. The fabrics thus produced by weaving and having the bristles or points protruding from one edge or selvage of the fabric are now suitable to be made up into brushes, which I do (particularly for round brushes) by winding the woven part of the fabric around the end of a handle till the size of brush desired is obtained; and I use like cementing materials between each succeeding layer of fabric, as heretofore employed, for causing the bristles or points to adhere, or when in the act of weaving I dip the ends of the bristles into cement, so that those which are placed in the same shed of the warp may adhere to each other and to the warp in which they are woven.

And having finished the winding of the fabric on a handle, I complete the brush by binding, as heretofore, or by a band of metal or by any convenient means. In some cases the woven fabric may be folded, and placed and securely held between two surfaces, or other means of fixing woven fabrics with bristles or other suitable points protruding from one edge or selvage to suitable handles may be resorted to.

What I claim is,

The weaving bristles or other suitable points into fabrics, and fixing them to suitable handles to form brushes.—In witness, &c.

JOHN FREDERICK CHATWIN.

Recorded April 6, 1853.

Specification of the Patent granted to THOMAS, *Earl of* DUNDONALD, *late of Chesterfield-street, in the County of Middlesex, but now of Belgrave-road, in the same County, Admiral in Her Majesty's Navy, for Improvements in Coating and Insulating Wire.*—Sealed October 6, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My improvements consist in various particulars tending to accomplish a combination of bituminous substances with gums and resins for coating and insulating wire.

In order fully to understand my process whereby such substances are rendered applicable to the aforesaid purpose; I refer first to the treatment and application of the bitumens of Trinidad and New Brunswick, set forth in the specification of my patent, enrolled on the 22d day of January, 1852, and now proceed to describe my improvements.

For instance, if I wish to produce an insulating and flexible covering for wire by a compound of gum shellac, (which gum is perhaps the best non-conductor,) I blend therewith rosin, say, in the ratio of four or five to one of shellac by pounding and sifting, and thereunto I add as a solvent about a tenth of their joint weight of unctuous or viscid oil of petroleum or of distilled tar, (in preference to petroleum, tar, naphtha, or other partly volatile solvents,) and subject them to gentle heat in a vessel surrounded by steam or hot water, stirring the mixture to produce solution, amalgamation, and permanent plasticity.

If I prefer to insulate and coat by combining this adhesive compound with bitumen, I pound, sift, and melt, the bitumens before adding the shellac and rosin mixture, by reason that bitumen requires more heat to dissolve it than vegetable gums or rosins can be exposed to without dete-

rioration, especially if rosins with unctuous oil are used without indurated gum as a mixture.

If in any stage of preparation the combination of materials for coating is found to be too soft for its intended purpose I add dry pounded bitumen, or if too indurated I mix more of the unctuous or viscid oil, or in the case of deficient tenacity or flexibility, I add caoutchouc to impart the qualities required.

The constituent proportions of an insulating coating for wire may advantageously be seventy-five parts of bitumen, ten parts of shellac and rosin mixture, and fifteen parts of caoutchouc, which proportions will insure the essential qualities of tenacity, flexibility, and cohesion.

The proportions, however, may be varied to suit the destination of the coated wire, whether it is to be laid in dry land or under water, in a hot or in a cold climate.

All the substances composing the coating must be thoroughly amalgamated by mastication, crushing, and rolling, besides pounding, sifting, and stirring. It is proper, however, to notice that separate solutions or indeed any solution of the materials by heat previous to their mastication may be dispensed with, and their combination effected by the steam or hot water surrounding the masticator, jointly with that produced by the friction of the forcibly combining substances, during a lengthened process.

My mechanical means of coating and insulating wire differs from that hitherto practised by causing the coating of the wire to adhere thereto by heat.

The process may be better understood by reference to fig. 1, which represents a case or box, A, B, C, D, into which the coating is compressed (after the manner practised in various branches of manufacture). Into this box there is an aperture, *e*, by which the wire enters, heated by gas-flame, G, or by any other device, in order that the circumjacent material, *h*, *h*, may be melted, and form a closely adhesive covering before the wire issues at *f*, *k*.

Fig. 2, is a transverse section exhibiting by the central dark circle, the wire with its adhesive coating in process of being stripped of any superfluous material by the circumference of the hole through which it passes. There is also an outer dark ring denoting an annular orifice for the purpose of forming a pipe or tube in casing the coating of the wire, thereby constituting, what may be considered a third envelope to insure insulation and protection.

The materials of the external pipe may be derived from the same box or case, or from another into which filamentous metallic or other substances may be introduced to strengthen the covering and resist friction, or to increase its weight when deemed necessary.

Grooved or plain rollers may also be employed to coat wires singly or in groups, guided (on their entrance between sheets of bituminous coating) by pins or holes, so that they shall be deposited in parallel equi-distant lines. These sheets may be combined with textile or fibrous substances in certain cases with advantage.

Lastly, the predominant portion of my coating being mineral and an antiseptic solvent amalgamated with the vegetable gums and resins, renders the insulating coating secure from decomposition by heat, damp, or destruction by insects.

I claim the adaptation and manipulation of gums and resins combined and treated as aforesaid, for coating an insulating wire.

I claim the means of producing an insulating covering by the influence of heat applied to wire, whether such coating shall be effected under pressure or simply by the solution of coating materials in contact with the wire.

I claim the means of preserving vegetable gums and rosins from being decomposed or destroyed by humidity and heat, or the ravages of insects by combining them with antiseptic oils and mineral substances.—In witness, &c.

DUNDONALD.

Recorded April 6, 1853.

Specification of the Patent granted to ROBERT ADAMS, *of King William-street, in the City of London, for Improvements in Ball Cartridges.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of affixing a metal chamber to a ball and wad to contain a charge of powder. The end of the chamber is closed with paper or other material. And in

order that my said invention may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a ball, a charging chamber, and a wad complete.

Fig. 2, shows a section thereof; and

Fig. 3, shows the three parts separately. *a*, is the ball, which is formed with a projecting tang, *b*, which passes through the wad, *c*, and into the metal cup or chamber, *d*, and is there riveted so as to combine the three parts together. The chamber, *d*, which I prefer to be raised out of thin sheet copper, is charged with powder, and a disc of thin paper or other material is pasted or cemented over the end of the chamber. In order to protect the end of the chamber, *d*, I employ a cap or cover, *e*, into which the end of the cartridge is placed; and I form such cap or cover with a shank, as shown, by which a number of such caps can have a wire passed through them, and thus I prevent them being lost; and for the convenience of stowing or packing cartridges such as above described, I find it convenient to have a plate of metal perforated with holes for the passage of the shanks of the covers, *e*, of the cartridges, so that by passing a wire through the shanks of several cartridges, they will be attached to the plate of metal, and the cartridges may be removed out of their end covers or cases, *e*, leaving such end cases or covers attached to the plate.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the precise forms of the parts.

But what I do claim is, the affixing a metal chamber (to contain the powder) to a ball and wad.—In witness, &c.

ROBERT ADAMS.

Recorded April 1, 1853.

Specification of the Patent granted to Isaac Westhorp, *of* 9, *George-yard, in the City of London, for Improvements in Grinding Wheat and other Grain.*—Sealed October 1, 1852.—(Communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of a mode of hanging mill-stones, by connecting the driving spindle to a block which is moveable on a bar across the centre of the stone, such bar being fixed in the stone by boxes let into it, and by adjusting and holding screws and nuts; and

Secondly, the invention consists of withdrawing air from a trunk or chamber in communication with the case of the mill-stones; the external air is thus induced to ascend the pipe down which the ground product descends from the stones, which product is thereby ventilated, and the dust carried up by the air is deposited in the trunk or chamber from which the air is withdrawn. And in order that the invention may be most fully understood, and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

Description of the Drawings.

Fig. 1, is a side view partly in section, showing the general arrangement of the machinery.

Fig. 2, is a plan of part of the same.

Figs. 3 and 4, show respectively a vertical section and a plan on a larger scale of the apparatus relating to the first part of my invention. *d*, is a block securely fastened on the shaft, F; in this block is a groove which receives the bar, T; this bar is secured to the stone at its two ends by means of the screws and nuts, Q, Q, but is at the same time capable of being adjusted to the correct working centre of the stone by means of the set screws and adjusting nuts, R, R, in the boxes, P, P, which are fastened in the stone; V, is a platform on the top of the stone to distribute the grain as it descends; *a*, is a tube or shoot which brings the grain from a reservoir above into the cylinder, *b*, from which it falls through the funnel, *c*, which is fixed to the upper or remaining stone, A, after which the grain passes between the stone, A, and the fixed stone, B, and is ground in the usual manner; the products fall through the trunk, G, into the receiver, H,

underneath which a sack, S, is placed to be filled in the usual manner; O, is an opening through which air enters, it passes up the pipe, G, meeting and thus cooling the products as they fall; it enters the case, D, which surrounds the stones, circulates round them, and finally escapes by the pipe, I, into the trunk, K, where it deposits the dust which it has brought up with it before it is removed by a fan or other suitable apparatus; L, are openings through which the dust is removed. It will be necessary that the funnel, *c*, be kept tight at its circumference by means of leather or fabric, to prevent the air from escaping there; F, is the shaft which drives the upper stone, A; it receives its motion by means of a band from the main driving shaft, which passes round the pulley, M. The mode in which the stone is driven by the shaft, F, is best seen at figs. 3 and 4.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the exact details herein described, so long as the peculiar character of my invention be preserved.

But what I claim is,

First, the combination or arrangement of apparatus for driving a mill-stone herein described; and

Secondly, the combination or arrangement of apparatus for introducing air to the ground products and to the mill-stones, as herein described.—In witness, &c.

ISAAC WESTHORP.

Recorded April 1, 1853.

Specification of the Patent granted to EDWARD LAMBERT HAYWARD, *of the Blackfriars-road, in the County of Surrey, for Improvements in Lock Spindles.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The general mode of adjusting the length of lock spindles has heretofore been by means of recesses formed in the sides of the spindles by which only comparative nice adjustment is obtained.

Now this invention consists of forming holes through

one end of a spindle, the other end being formed with a slot through it into which a screw passes, by which a very nice and ready adjustment of the length is obtained. And in order that my said invention may be most fully understood and readily carried into effect I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a section of part of a door having two knobs or handles and spindle applied thereto; and

Fig. 2, shows two views of a spindle separately; *a*, is the part of the door; *b*, *b*, are two knobs or handles, and the spindle, *c*, is formed and adjusted in the following manner: it has at one end a series of holes, c^1, as is shown, which are similar to what have heretofore been used, into one of these holes (according to the thickness of the door) the screw, *d*, will enter, and it should be the one which will leave as little requirement for adjustment at the other end of the spindle as may be, because it is at the other end that the nice adjustment of the length is to be obtained; c^2, is a slot, c^3, a screw which enters the slot from that end of the spindle, and it is against the end of this screw, c^3, that the screw pin, *e*, comes when it is introduced into its place. It will be understood that if the screw, c^3, does not enter sufficiently into the slot that the handles would not be close up to their positions and the same would be loose, and on the other hand if the screw, c^3, is screwed too far into the slot the screw pin, *e*, would not pass through the slot in the spindle, hence it should be understood that the screw, c^3, should only be screwed into the slot to such an extent as to ensure the screw pin, *e*, coming against its end, leaving the handles or knobs only so much play that they may turn with the spindle with ease and not offer too much friction to the spring in the lock. I would remark that in place of having the slot at only one end it is evident that in place of having the several holes a slot and screw may be used at both ends of the spindle.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that I do not confine myself to the precise details herein shown and described so long as the peculiarity of the invention be retained. But what I claim is the combi-

nation or construction of lock spindles herein described.—In witness, &c.

EDWARD LAMBERT HAYWARD.

Recorded April 1, 1853.

Specification of the Patent granted to DANIEL EBINGRE, *of Brussels, for Improvements in the Manufacture of Animal Charcoal.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of rendering the dust of animal charcoal (whether produced in the manufacture of the ordinary granular charcoal or by reducing animal charcoal to powder) into paste, and then into a granular form. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing and Process.

Fig. 1, is a side view;

Fig. 2, an end view; and

Fig. 3, a plan of apparatus such as I prefer to employ, but the same may be varied. I take any convenient quantity of the powder of animal charcoal and combine therewith a quantity of clay, mineral pitch, and water, such materials being mixed in about the following quantities:

For every 100lbs of animal charcoal in powder,
130lbs. of clay,
4lbs. of mineral pitch,
100lbs. of water.

And I cause these matters to soak together well, stirring them from time to time for several days, and this may be conveniently done in a tub or similar vessel, stirring the matters from time to time; and at the end of some days, four or five, I pour the matters into the vessel, B, having in it a stirrer or agitator put in motion by a strap acting on the drum, *c*, such strap being put in motion by the drum, *d*, as shown. The drum, *d*, receiving its motion from the first mover, which in this arrangement is a crank handle to

be moved by hand, but other power may be employed, particularly where large quantities of the materials are being acted on. The drum, *d*, is on the axis of a stirrer in the tub or vessel, C, which receives its supply of materials from the vessel, B, there being a suitable opening from one vessel to the other but closable by a suitable sluice or valve. The materials from the vessel or tub, C, are run into the tub or vessel, D, and thence into the vessel, E, as will be hereafter fully described. The materials having been well mixed in the vessel, B, they are run into the vessel, C, and there further mixed by stirring, and from thence they are run into a vessel, D, in which are two grinding stones which act on and grind the mixture. Motion is communicated to one of the stones by an axis, *e*, which receives motion from the axis, *f*, by means of bevilled-toothed wheels, as shown. The axis, *f*, receives motion from a strap acting on the drum, *g*, such strap being put in motion by hand, as shown in respect to the other parts of the apparatus, or by other power.

From the vessel, D, the mixed materials flow into a tub or receiver, E. When the materials are well ground, and the materials are to be ladled out of the vessel, E, and placed on brown paper, spread over a tray, formed by parallel bars, which I place in a drying stove, heated to about 104 degrees of Fahrenheit, and, when dry, the matters are to be divided by a cutting instrument. The matters thus prepared are to be carbonized together, with a quantity of bones (deprived of their fat), say at the rate of about seventy-six parts, by weight, of the composition above described, to one hundred and twenty-four parts, by weight, of bones; and I cause these materials to be calcined in like manner to what bones have heretofore been calcined. I cause the calcined product to granulate, as heretofore, when treating calcined bones only, and the same will be fit for like uses, as granulated animal charcoal.

In the above description, I have been particular in giving an exact statement of the apparatus used by me, and of the process, as I carry it on. But I would remark, that I do not confine myself thereto, as the same may be varied without departing from my invention, which I declare to consist of rendering the dust of animal charcoal (whether produced in the manufacture of the ordinary granular charcoal, or by reducing animal charcoal to

powder) into paste, and then into a granular form.—In witness, &c.

DANIEL EBINGRE.

Recorded April 1, 1853.

Specification of the Patent granted to CHARLES HENRY NEWTON, *of* 92, *Camden-road Villas, in the County of Middlesex, and* GEORGE LEEDHAM FULLER, *of Peckham, in the county of Surrey, for Improvements in Protecting Electric Telegraph Wires.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of using troughs of wood, slate, or other suitable material, for receiving one or more wires, and using covers, fitted into or over such troughs; the covers being fixed, when desired, by hoops and wedges, or by other convenient means.

The object of the invention is to obtain a cheap and ready means of laying wires under, or immediately upon, the ground, and yet that the wires, although ordinarily closely covered, may be readily got at, in case of need. The troughs may be made single, as shown in figs. 2, 3, and 4, or they may have one or more longitudinal partitions, as indicated by fig. 1. The covers may either cover over, or enter into and cover the troughs, or both, as will readily be understood, by reference to the several sections, figs. 1, 2, 3, 4; and in laying troughs, the covers are applied, so as to break joint, in respect to the troughs, as is shown in figs. 5 and 6, which show longitudinal views and covers. The mode by which the covers are fixed to the troughs, and the two held securely together, so as to make one continuous covered trough, is by means of hoops, such as is shown at fig. 6, and also in its place on one of the longitudinal views, where it is shown as being wedged in such manner as to hold all parts securely together.

We would remark, that other means may be resorted to for fixing the hoops, such as forming or fixing of inclines on the covers or on the troughs; but we believe that wedges, such as are shown, will be found to be the best. The troughs

and covers may be made of wood, and impregnated with matters to protect them from decay, as is well understood; or the troughs and covers may be made of slate, or earthenware, or glass, and strapped and combined together by means of hoops of metals and wedges or otherwise, as above explained. From the above description, it will be evident that electric telegraphic wires, insulated by coating with gutta percha or other suitable matter, may be cheaply laid and protected, and yet be readily accessible, by reason of all parts being combined simply by the use of metal bands, which, by the movement of wedges or by moving them on inclined surfaces, formed or affixed at proper places on the covers or on the troughs, will readily admit of the covers being removed and retained, and fixed to their places.

Having thus described the nature of our invention, and the manner of performing the same, we would have it understood, that what we claim is, the combination of parts, as herein described.—In witness, &c.

CHARLES HENRY NEWTON.
GEORGE LEEDHAM FULLER.

Recorded April 1, 1853.

Specification of the Patent granted to ALSOP SMITH, *of Westminster, in the County of Middlesex, for Improvements in the Manufacture of Firewood.*—Sealed October 14, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of cutting blocks or pieces of wood, with numerous saw cuts, so as nearly to sever it into separate slabs, or pieces, thus producing numerous passages for air, by which combustion is facilitated. And for convenience of use, the saw cuts, at intervals, penetrate more deeply than at others, at which places the block or length of wood may be broken into longer or shorter pieces, according to the extent of fire desired to be immediately ignited. And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows an underside, and fig. 2, a plan, or upper side view of a length of wood, cut suitably, for carrying out my invention. These lengths of wood, it will be seen, are only cut very nearly through, and the nearly separted pieces are held together by the uncut part, *a*, which runs from end to end of the piece. The saw cuts are made about half an inch apart, and the cuts are to the width of about one-eighth of an inch; but these dimensions may be varied, and it will be seen, that, at the parts, *b*, *b*, the saws have cut further into the wood, and that, therefore, the length of wood will be more readily broken into pieces at those places, thus offering facility to a person who is about to light a fire, in breaking off such a length or piece of wood as the extent of fire desired to be lighted may require. The most convenient mode of cutting wood for this purpose is to employ a series of circular saws, on an axis, such saws being fixed at a distance apart, equal to that it is wished to make the saw cuts one from another; and in order to cause a deeper cut at intervals, where the length of wood is to be more readily separable, saws of somewhat larger diameter are used. The length of wood is then forced up to the several saws till they have made their cuts to the extent desired, and then the opposite side of the wood is to be pressed up to the series of saws, when the other side will be cut to the required extent, leaving a portion, *a*, uncut, and where the larger saws come, that is, at *b*, *b*, the cut will be more deep.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood, that what I claim is, the manufacture of firewood herein described.—In witness, &c.

ALSOP SMITH.

Recorded April 14, 1853.

Specification of the Patent granted to JAMES WILSON, *of* 37, *Walbrook, in the City of London, for Improvements in Printing Fabrics of Silk, or partly of Silk.*—Sealed October 22, 1852.

To all to whom these presents shall come, &c., &c.—This invention has for its object the production of a new

class of printed fabrics, where the pile is composed of silk, and consists of weaving the fabric as heretofore without pile, and then raising the pile either before or after printing and finishing the printed piled surface thus obtained.

The fabrics above mentioned are commonly called "tissue," which is woven either with a silk or cotton warp, and shute of net or spun silk, which is thrown or floated upon the surface in the process of weaving. When woven, the piece is strained in a frame to the tension required, and a pile or nap is raised (from the face of the fabric on which the silk appears) by the application of cards and teazles. The piece having thus undergone the raising process, the pile or nap if required shorter is then passed through a cropping or shearing machine as many times as may be required to reduce the nap or pile to the length desired, after which it is ready for the printer. And I would here state that the above manufacture of fabrics is not new, and separately I make no claim thereto; and I would also state that my invention consists of combining with such fabrics the process of printing, by which a new and peculiar manufacture of printed silk piled fabric is obtained, differing from printed velvets and such like fabrics (composed of silk or partly of silk) where the pile is produced by the act of weaving. And I would further state that I make no claim to the processes of preparing such fabrics for, or the process of printing when separately considered, they being (subject to some modifications to adapt them to the peculiar fabrics,) similar to processes of preparation and printing resorted to when printing other fabrics.

Process for Printing.

The fabric is first soaked for two hours in a solution of muriate or oxymuriate of tin diluted with water to the specific gravity of two degrees Twaddell's hydrometer, and is then well washed in running water, which is expressed by rollers; the fabric is then brushed to lay the pile, and is to be slowly dried in a room without heat.

Previous to the printing the pile is laid even and smooth by brushing with a moderately hard brush, and the fabric is passed through a cold callendar, which imparts a more even surface.

The pile is not only smoothed with a brush after being callendered, but a weak solution of gum dragon is applied, which holds down the pile during printing.

The printing is best performed by surface blocks laid on either by hand or by a machine. If the back or body of the fabric be of cotton care is required in using muriate of tin or oxalic acid sparingly; so as not to injure and weaken the cotton back.

The colours may be thickened with gum or starch:— "Black," is obtained from a concentrated decoction of logwood with a small addition of nitrate of iron; "scarlet reds," from solutions of cochineal acidulated with oxalic acid; "pinks," solutions of cochineal in strong liquid ammonia; "blues," from cyanite or red prussiate of potash; "yellow," from the precipitate yielded by a strong solution of quercitron bark treated with muriate of tin; "greens," by adding to yellow a blue colour made from extract of indigo; "lilacs," are obtained from orchil; "marone" and "browns," by well incorporating red and yellow with black. These are all well understood. When the printing is completed the material is suspended by woollen threads or very fine hooks in an open chamber or box, two or three blankets are extended to close the open top, and a wooden cover is placed over all and pressed down close by weights. Steam is then admitted by a perforated opening at the bottom of the box, and is kept up for one hour. When the fabric is much covered with printing or when it has a coloured ground, it is taken out at the expiration of thirty minutes, aired for ten or fifteen minutes, and is then replaced for another steaming of thirty minutes. The fabric is then well washed to remove the superfluous gum or thickening, and passed through rollers or a hydro-extractor to discharge the water, and is rinced in a back of water, slightly acidulated with sulphuric acid brushed and dried. The pile is again brushed to restore it to its normal state, and the fabric is again subjected to the cutting machine, if necessary, to remove any superfluous nap or pile, after which it is either dressed by hand with hot irons or in the usual manner by cylinders and delivered to the warehouse.—In witness, &c.

James Wilson.

Enrolled April 22, 1853.

Specification of the Patent granted to Robert Hoppen, *of Plymouth, in the County of Devon, a Master in Her Majesty's Navy, for Improvements in Apparatus for Mincing Meat.*—Sealed October 21, 1852.

To all to whom these presents shall come, &c., &c.—This invention consists of employing any convenient number of knives working through slots or openings in a plate suspended from above, whereby the knives are cleansed each time they rise, thus is the choking of the blades, which was heretofore consequent on using several blades or knives side by side prevented. And in order that my invention may be more fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

The knives are fixed parallel in a frame, as heretofore, and the frame is caused to rise and fall in chopping meat, as is well understood. There is a plate suspended from the upper part of the machine by rods, such plate has cut in it as many slots or openings as there are knives in the machine through which slots or openings the knives work, and the slots are only made of a size to admit the knives moving freely through them, the plate thus acting as a scraper on each side of each knife or blade, by which it will be evident that as the knives rise after chopping or mincing the meat on the block or surface below, they will pass through the slots or openings, and any meat which may be between the knives will be forced down from between them. The plate is fixed or retained in such position that the cutting edges of the knives or blades do not rise beyond or above the plate, but only to the upper surface thereof.

Having thus described the nature of the invention, and the manner of performing the same, I would have it understood that what I claim is, the application of the plate or scraper to the several knives, as herein described.—In witness, &c.

Robert Hoppen.

Enrolled April 21, 1853.

PATENTS SEALED TO APRIL 20, 1853.

38. The Honourable WILLIAM ERSKINE COCHRANE, of Albany-street, Regent's-park, in the county of Middlesex, for Improvements in unloading coals from ships or vessels.—Dated October 1, 1852. Sealed March 28, 1853.

71. JOHN AMBROSE COFFEY, of Providence-row, Finsbury, in the county of Middlesex, Pharmaceutical Engineer, for Improvements in apparatus for performing various chemical and pharmaceutical operations, hereby denominated "Coffey's improved patent esculapian apparatus," parts whereof are applicable to steam-boilers, steam and liquid guages, stills, and syphons.—Dated October 1, 1852. Sealed March 28, 1853.

175. MICHAEL KAVANAGH, of Notting-hill, in the county of Middlesex, Locksmith, for Certain improvements in mortice-lock spindles. —Dated October 2, 1852. Sealed March 28, 1853.

177. WILLIAM SIMPSON, Paper Maker, and JOHN SHELTON ISAAC, Sadler, both of Maidstone, in the county of Kent, for An improved composition to be used principally as a substitute for wood or other materials where strength and lightness are required in the manufacture of various articles.—Dated October 2, 1852. Sealed March 28, 1853.

217. MICHAEL ANGELO GARVEY, of No. 10, Jeffery's-terrace, Kentish-town, Middlesex, for More effectually dissipating the shock of collision in railway trains, reducing the surfaces exposed to atmospheric resistance, and diminishing oscillation by making portions of the whole of each carriage elastic in every direction, and increasing the power of the carriage to resist severe pressure by means of metallic tubes in its longitudinal tubes.—Dated October 5, 1852. Sealed March 28, 1853.

257. ALEXIS DELEMER, of Radcliffe, in the county of Lancaster, Gentleman, for Improvements in machinery or apparatus for manufacturing piled fabrics.—Dated October 6, 1852. Sealed March 28, 1853.

298. EDWARD JOSEPH HUGHES, of Manchester, for An improved method of purifying and concentrating the colouring matter of madder, munjeet, and spent madder.—Dated October 8, 1852. Sealed March 28, 1853.

311. AUGUSTE EDOUARD LARADOUX BELLFORD, of No. 16, Castle-street, Holborn, for Improvements in apparatus for manufacturing soda water and other aerated liquids.—Dated October 9, 1852. Sealed March 28, 1853.

562. ARNOLD JAMES COOLEY, of Parliament-street, Westminster, Consulting Chemist, for Improvements in treating woven and felted fabrics to render the same repellent to water and damp.—Dated October 29, 1852. Sealed March 28, 1853.

919. JAMES BARLOW, of King William-street, in the city of London, Ironmonger, for Improvements in stands or supports for casks, barrels, and other like vessels.—Dated November 30, 1852. Sealed March 28, 1853.

1170. GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, in the

county of Surrey, Managing Director of Price's Patent Candle Company, for Improvements in treating certain fatty bodies. — Dated December 27, 1852. Sealed March 28, 1853.

22. GUSTAVE EUGENE MICHEL GERARD, of No. 12, Rue Hauteville, Paris, for improvements in manufacturing and treating caoutchouc.—Dated January 5, 1853. Sealed March 28, 1853.

77. JOHN M'DOWALL, of Walkingshaw Foundry, Johnstone, in the county of Renfrew, North Britain, for Improvements in cutting or reducing wood and other substances. — Dated January 12, 1853. Sealed March 28, 1853.

154. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements applicable to clocks and other timekeepers for the purpose of indicating not only the time of day, but the day of the week, the month, and the year, which invention he intends to denominate "Hawes's Calendar Clock or Timepiece."—Dated January 21, 1853. Sealed March 28, 1853.—(A communication.)

195. ISAAC DAVIS, of No. 119, High Holborn, in the county of Middlesex, Optician, for Improvements in optical and mathematical instruments.—Dated January 26, 1853. Sealed March 28, 1853.

242. GEORGE TWIGG and ARTHUR LUCAS SILVESTER, of Birmingham, Manufacturers, for Improvements in apparatus for cutting and affixing stamps and labels.—Dated January 29, 1853. Sealed March 28, 1853.—(Partly a communication.)

250. WALTER WILLIAMS, junior, of West Bromwich, in the county of Stafford, Iron Master, for Improvements in machinery for cutting or shearing iron and other metals.—Dated January 31, 1853. Sealed March 28, 1853.

254. THOMAS LIGHTFOOT, of Accrington, in the county of Lancaster, for Improvements in glazes for pottery or other similar materials.—Dated January 31, 1853. Sealed March 28, 1853.

276. ALFRED VINCENT NEWTON, of Chancery-lane, Mechanical Draughtsman, for Improvements in block-printing machinery.—Dated February 1, 1853. Sealed March 28, 1853.

7. JOHN HENRY GARDNER, of Poppins-court, in the city of London, for Improvements in toilet-tables.—Dated October 1, 1852. Sealed March 30, 1853.

42. OSWALD DODD HEDLEY, of Newcastle-upon-Tyne, for Improvements in getting coal and other minerals.—Dated October 1, 1852. Sealed March 30, 1853.

44. JAMES HODGSON, of Liverpool, Engineer and Iron Ship-builder, for Improvements in machinery for draining land.—Dated October 1, 1852. Sealed March 30, 1853.

52. WALTER M'LELLAN, of Glasgow, Iron Merchant, for Improvements in the manufacture of rivets and in working in metals.—Dated October 1, 1852. Sealed March 30, 1853.

63. JOHN FORDHAM STANFORD, of Stangate-street, Dover, in the county of Kent, Architect and Civil Engineer, for Improved machinery and apparatus for manufacturing bricks, tiles, and similar building materials, which is hereby denominated "The Complete Brickmaker." —Dated October 1, 1852. Sealed March 30, 1853.

66. GEORGE HOLMES, of No. 31, Great Queen-street, Lincoln's-inn-fields, in the county of Middlesex, for Certain improvements in the manufacture or construction of coats, capes, and other upper gar-

ments of personal attire.—Dated October 1, 1852. Sealed March 30, 1853.

68. GEORGE ELLINS, of Droitwich, in the county of Worcester, for An improved method and apparatus for preparing flax straw for dressing and cleaning.—Dated October 1, 1852. Sealed March 30, 1853.

69. WILLIAM MOORE, of Birmingham, Gun-maker, and WILLIAM HARRIS, of Birmingham aforesaid, for An improvement in repeating pistols and rifles.—Dated October 1, 1852. Sealed March 30, 1853.

72. EDWARD WILKINS, of No. 60, Queen's-row, Walworth, in the county of Surrey, Gentleman, for Improvements in the distribution and application of water or other liquid manure to promote vegetation. —Dated October 1, 1852. Sealed March 30, 1853.

91. WILLIAM WALKER, of Liverpool, for Improvements in wheels, for railway-carriages, and in the mode or modes of manufacturing the same.—Dated October 1, 1852. Sealed March 30, 1853.

92. THOMAS LAWES, of No. 32, City-road, London, for Improvements in the manufacture of agricultural implements, or an improved agricultural implement.—Dated October 1, 1852. Sealed March 30, 1853.

93. THOMAS LAWES, of No. 32, City-road, St. Luke's, county of Middlesex, for An improved quilt or coverlid.—Dated October 1, 1852. Sealed March 30, 1853.

94. THOMAS LAWES, of No. 32, City-road, St. Luke's, county of Middlesex, for Improvements in generating steam.—Dated October 1, 1852. Sealed March 30, 1853.

104. MARTYN JOHN ROBERTS, of Gerrard's-cross, in the county of Bucks, Esquire, for Improvements in the manufacture of oxide of zinc and tin.—Dated October 1, 1852. Sealed March 30, 1853.

110. JOHN WRIGHT and EDWIN STURGE, of the Cornwall-road, Lambeth, in the county of Surrey, Engineers, for Improved machinery for the manufacture of envelopes.—Dated October 1, 1852. Sealed March 30, 1853.

111. JOHN REMINGTON, of Sloane-street, Chelsea, Civil Engineer, and ZEPHANIAH DEACON BERRY, of Victoria-road, Pimlico, Gas-fitter and Engineer, both in the county of Middlesex, for Improvements in gas-meters, or apparatus for measuring gas or other elastic fluids.—Dated October 1, 1852. Sealed March 30, 1853.

139. WILLIAM LEWIS, of Piccadilly, in the county of Middlesex, Surgeon and Apothecary, for Improvements in compounding medicines in the form of pills.—Dated October 1, 1852. Sealed March 30, 1853.

142. HENRY BERNOULLI BARLOW, of Manchester, for Improvements in the manufacture of cylinders for carding cotton and other fibrous substances.—Dated October 1, 1852. Sealed March 30, 1853.

143. JOHN LAWRENCE GARDNER, of Whitecross-street, London, Inkmaker, for Improvements in bottles and other vessels for holding liquids.—Dated October 1, 1852. Sealed March 30, 1853.

144. WILLIAM SEATON, of Coleshill-street, Pimlico, London, for Improvements in the construction of iron vessels, and in sheathing or covering the same.—Dated October 1, 1852. Sealed March 30, 1853.

147. EDWIN WHELE, of Shiffnal, in the county of Salop, Engineer, for Improvements in apparatus for burning candles, and in horological apparatus attached thereto.—Dated October 2, 1852. Sealed March 30, 1853.

148. EDWARD WILLIAM KEMBLE TURNER, of Praed-street, Paddington, in the county of Middlesex, for Certain improvements in machinery for sweeping or cleaning chimneys; also for more effectually extinguishing them when on fire.—Dated October 2, 1852. Sealed March 30, 1853.

156. JOSEPH BROWN, of Leadenhall-street, in the city of London, Upholsterer and Cabinet-maker, for Improvements in beds, sofas, chairs, and other articles of furniture, to render them more suitable for travelling and other purposes.—Dated October 2, 1852. Sealed March 30, 1853.

165. MOSES POOLE, of Serle-street, in the county of Middlesex, Gentleman, for Improvements in constructing bridges, viaducts, and such like structures.—Dated October 2, 1852. Sealed March 30, 1853.

170. EDWARD ALLPORT, of Aldermanbury, in the city of London, Button Manufacturer, for An improvement in the manufacture of buttons, by making them with elastic shanks.—Dated October 2, 1852. Sealed March 30, 1853.

171. WILLIAM JAMES LEWIS, of London, but now residing at Turin, Civil Engineer, for A slideless stadia sight applicable to rifles and other fire-arms.—Dated October 2, 1852. Sealed March 30, 1853.

173. THEOPHILUS REDWOOD, of Montague-street, Russell-square, London, for Improvements in the manufacture of gelatine.—Dated October 2, 1852. Sealed March 30, 1853.

176. PETER HYDE ASTLEY, of Stratford, in the county of Essex, Gentleman, and JOHN FIGGINS STEPHENS, of De Beauvoir-square, Kingsland, in the county of Middlesex, Gentleman, for An improved construction for floating vessels, having for its object the rendering them safe means of transit.—Dated October 2, 1852. Sealed March 30, 1853.

180. JOHN SLACK, of Manchester, in the county of Lancaster, Manager, for Improvements in the manufacture of textile fabrics.—Dated October 2, 1852. Sealed March 30, 1853.

222. ARISTIDE BALTHAZAR BERARD, of Paris, Engineer, for Improvements in the construction of jetties, breakwaters, and docks, and other hydraulic constructions.—Dated October 5, 1852. Sealed March 30, 1853.

225. JOSEPH APSEY, of Blackfriars, in the county of Surrey, Engineer, for Improvements in ship-building, and in machinery for propelling.—Dated October 5, 1852. Sealed March 30, 1853.

242. WILLIAM MAKENZIE, of Glasgow, in the county of Lanark, North Britain, Publisher, and GEORGE BLAIR, of the same place, Master of Arts, for Improvements in the arrangement and construction of graduated scales for measuring instruments.—Dated October 5, 1852. Sealed March 30, 1853.

282. JOHN BLAIR, of Ducie Bridge Mill, Manchester, in the county of Lancaster, for Certain improvements in the manufacture of waddings, and in the machinery for making the same.—Dated October 7, 1852. Sealed March 30, 1853.

292. SAMUEL RAINBIRD, of Norwich, in the county of Norfolk, Builder, for Improvements in grappling and raising sunken vessels and other submerged bodies, and in apparatus for that purpose.—Dated October 7, 1852. Sealed March 30, 1853.

326. CHARLES WILLIAM SIEMENS, of Adelphi-terrace, in the county

of Middlesex, for Improvements in engines to be worked by steam and other fluids.—Dated October 9, 1852. Sealed March 30, 1853.

371. WALTER M'FARLANE, of Glasgow, in the county of Lanark, North Britain, Iron Founder, for Improvements in water closets.—Dated October 13, 1852. Sealed March 30, 1853.

383. DONALD GRANT, late of Her Majesty's Ordnance Department, of Luton-place, Greenwich, in the county of Kent, Esquire, for Improvements in the means of applying the heat derived from the combustion of gas.—Dated October 14, 1852. Sealed March 30, 1853.

408. WILLIAM JAMES MATTHIAS and THOMAS BAILEY, of Clerkenwell, in the county of Middlesex, Clock Makers, for Improvements in clocks and watches.—Dated October 15, 1852. Sealed March 30, 1853.

459. CHARLES WEIGHTMAN HARRISON and JOSEPH JOHN HARRISON, both of Richmond, in the county of Surrey, Engineers, for Improvements in protecting insulated telegraphic wires.—Dated October 20, 1852. Sealed March 30, 1853.

472. JOSEPH ROSE, Foreman and Manager to John Leadbeater, of Aldersgate-street, in the city of London, Lock Manufacturer, for Improvements in locks.—Dated October 21, 1852. Sealed March 30, 1853.

490. STANISLAUS HOGA, of Nassau-street, in the county of Middlesex, Gentleman, for Improvements in separating gold from the ore.—Dated October 22, 1852. Sealed March 30, 1853.

545. CHARLES BENJAMIN NORMAND, of Havre, in the Republic of France, Ship-builder, for Improvements in machinery for sawing wood.—Dated October 27, 1852. Sealed March 30, 1853.

1064. JEAN FRANÇOIS ISIDORE CAPLIN, of Strawberry-hill, near Manchester, in the county of Lancaster, Orthorachidist, for Improvements in apparatus for preventing or curing a stooping of the head or of the body.—Dated December 15, 1852. Sealed March 30, 1853.

1153. JOHN HINKS, of Birmingham, and GEORGE WELLS, of Birmingham, Manufacturers and Copartners, for a new or improved penholder.—Dated December 24, 1852. Sealed March 30, 1853.

51. HEZEKIAH MARSHALL, of Canterbury, in the county of Kent, Architect, for Certain Improvements in the transmission and emission of air and sound.—Dated January 7, 1853. Sealed March 30, 1853.

79. JOHN HICK, of Bolton-le-Moors, in the county of Lancaster, Engineer, for Certain improvements in the method of lubricating revolving shafts and their bearings or pedestals.—Dated January 12, 1853. Sealed March 30, 1853.

152. GEORGE THORNTON, of the Grange, Gargrave, in the county of York, Civil Engineer, for Certain improvements in propelling vessels.—Dated January 21, 1853.—Sealed March 30, 1853.

156. MATTHEW ANDREW, of Hyde, in the county of Chester, Clerk, for Certain improvements in fasteners for windows.—Dated January 21, 1853. Sealed March 30, 1853.

273. JOHN COCKERILL, of the town of Kingston-upon-Hull, Grocer, and THOMAS BARNETT, of the same town, Millers, for Improvements in the construction and use of coffee roasters.—Dated February 1, 1853. Sealed March 30, 1853.

275. JAMES CARTER, of Oldham, in the county of Lancaster, Painter,

for An improved rotary engine. Dated February 1, 1853. Sealed March 30, 1853.

299. Alfred Tylor, of Warwick-lane, Newgate-street, in the city of London, and Henry George Frasi, of No. 84, Herbert-street, New North-road, in the county of Middlesex, for Improvements in water-closets.—Dated February 3, 1853. Sealed March 30, 1853.

304. Frederick John Jones, of Addle-street, in the city of London, Manufacturer, for Improvements in fastenings for bands, belts, straps, and other similar articles. Dated February 4, 1853. Sealed March 30, 1853.—(A communication.)

26. John Macintosh, of Berners-street, in the county of Middlesex, Civil Engineer, for Improvements in evaporation.—Dated October 1, 1852. Sealed April 1, 1853.

50. Walter Henry Tucker, of Fore-street, Tiverton, in the county of Devon, Watch Maker, for Certain improvements in locks, (applicable to locks for all purposes), by which they can be made so as to combine increased and perfect security with simplicity and cheapness of construction.—Dated October 1, 1852. Sealed April 1, 1853.

73. Edward Wilkins, of No. 60, Queen's-row, Walworth, in the county of Surrey, Gentleman, for Improvements in ruling and folding the leaves of account books or other books used for mercantile purposes, and in making entries therein and delivering vouchers therefrom with accuracy and despatch.—Dated October 1, 1852. Sealed April 1, 1853.

82. Henry Mortlock Ommanney, of the city of Chester, Esquire, for Improvements in certain parts of machinery for spinning cotton and other fibrous substances.—Dated October 1, 1852. Sealed April 1, 1853.

83. Henry Mortlock Ommanney, of the city of Chester, Esquire, for An improved furnace for melting of metals in crucibles.—Dated October 1, 1852. Sealed April 1, 1853.

89. James Nichols Marshall, of Bideford, in the county of Devon, Bacon Factor, for An improved wheel for carriages and other vehicles. Dated October 1, 1852. Sealed April 1, 1853.

131. Henry Mortlock Ommanney, of the city of Chester, Esquire, for An improvement in the manufacture of guns, cannon, and other ordnance.—Dated October 1, 1852. Sealed April 1, 1853.

132. Henry Mortlock Ommanney, of the city of Chester, Esquire, for An improvement in the manufacture of cylinders for hydraulic presses and other engines.—Dated October 1, 1852. Sealed April 1, 1853.

133. Henry Mortlock Ommanney, of the city of Chester, Esquire, for An improvement in the manufacture of wheels for railway carriages.—Dated October 1, 1852. Sealed April 1, 1853.

134. Henry Mortlock Ommanney, of the city of Chester, Esquire, for An improvement in the manufacture of stamped heads for crushing ores.—Dated October 1, 1852. Sealed April 1, 1853.

205. Martin Billing, of Holborn, London, and Charles Henry Street, of Birmingham, in the county of Warwick, Brass Founder, for Certain improvements in the combination of metals having different capacities of vibration to be used in the construction of certain useful articles.—Dated October 4, 1852. Sealed April 1, 1853.

239. Pierre Frederic Gougy, of Castle-street, Leicester-square, in the county of Middlesex, Gentleman, for Improvements in paving

streets, roads, and ways.—Dated October 5, 1852. Sealed April 1, 1853.

254. ROBERT SHAW, of Portland, in the county of Waterford, Ireland, Cotton Spinner and Manufacturer, for Pre-arranging, ascertaining, and registering the rate of travelling of locomotive engines, and of railway or other carriages.—Dated October 6, 1852. Sealed April 1, 1853.

264. ALFRED VINCENT NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Mechanical Draughtsman, for Improvements in apparatus for manufacturing gas and coke.—Dated October 7, 1852. Sealed April 1, 1853.

283. THOMAS GREAVES, of Manchester, in the county of Lancaster, for Certain improvements in the manufacture of waddings, and in machinery for making the same.—Dated October 7, 1852. Sealed April 1, 1853.

289. JOHN TATHAM and DAVID CHEETHAM, of Rochdale, in the county of Lancaster, Machine Maker, for Improvements in rollers or bosses used for drawing or conveying textile materials and fabrics.—Dated October 7, 1852. Sealed April 1, 1853.

299. THOMAS PASCALL, of Norwood, in the county of Surrey, Tile Manufacturer, for Improvements in ridge tiles and roofing.—Dated October 8, 1852. Sealed April 1, 1853.

319. JAMES JOHNSON, of Worsley, in the county of Lancaster, Gentleman, for Improvements in heating, ventilating, and sewering cottages or dwelling-houses.—Dated October 9, 1852. Sealed April 2, 1853.

359. LEON GODEFROY, Manufacturer, of Paris, for Improvements in covering or packing rollers for printing fabrics.—Dated October 12, 1852. Sealed April 2, 1853.

362. WILLIAM TATHAM, of Rochdale, in the county of Lancaster, Machine Maker, for An improved mode or improved modes of preventing accidents on railways.—Dated October 13, 1852. Sealed April 2, 1853.

394. ROBERT HAWKINS NICHOLLS, of Bedford, in the county of Bedford, Gentleman, for Horse-hoeing land.—Dated October 15, 1852. Sealed April 2, 1853.

465. JOSEPH CUNDY, of No. 2, Victoria-grove, Kensington, in the county of Middlesex, for Improvements in hot-air stoves.—Dated October 20, 1852. Sealed April 2, 1853.

458. PETER EVANS DONALDSON, of Shrewsbury, in the county of Salop, Engineer, for Improvements in dam-locks and lock-gates.—Dated October 20, 1852. Sealed April 2, 1853.

492. JOHN HOLMES, of Manchester, in the county of Lancaster, Engineer and Machinist, for Improvements in lathes.—Dated October 23, 1852. Sealed April 2, 1853.

494. PHILIP BERRY, of Manchester, in the county of Lancaster, Machine Maker, for Improvements in machinery or apparatus for manufacturing bolts and nuts, and other similar articles in metal.—Dated October 23, 1852. Sealed April 2, 1853.

548. WILLIAM THORP, Dyer, Bleacher, and Finisher, of Collyhurst, near Manchester, in the county of Lancaster, for Certain improvements in steam-boxes, and the mode of heating press-plates used in hot-pressing of silks, de laines, cobourgs, merinos, fancy goods, and other similar fabrics.—Dated October 28, 1852. Sealed April 2, 1853.

736. SOMERVILLE DEAR, of Leeds, in the county of York, Ma-

chine Maker, for Certain improvements in the arrangement and apparatus of looms for weaving centre or other large patterns or designs in linen, cotton, silk, wool, or other fibrous materials.—Dated November 13, 1852. Sealed April 2, 1853.

1155. JOSEPH BURCH, of Crag-hall, near Macclesfield, in the county of Chester, Carpet Manufacturer, for Certain improvements in machinery for reaping, loading, stacking, and storing grain, and other agricultural produce.—Dated December 24, 1852. Sealed April 2, 1853.

1156. JOSEPH BURCH, of Crag-hall, near Macclesfield, in the county of Chester, Carpet Manufacturer, for Certain improvements in machinery applicable to thrashing, winnowing, cleaning, and sorting grain, and to other agricultural purposes.—Dated December 24, 1852. Sealed April 2, 1853.

1157. JOSEPH BURCH, of Crag-hall, near Macclesfield, in the county of Chester, Carpet Manufacturer, for Certain improvements in passenger and other carriages.—Dated December 24, 1852. Sealed April 2, 1853.

69. JOSEPH BEATTIE, of Lawn-place, South Lambeth, in the county of Surrey, Engineer, for Certain improvements for economizing fuel in the generation and treating of steam.—Dated February 11, 1853. Sealed April 2, 1853.

368. ROBERT DAVIS REA, Proprietor of the Great Central Horse and Carriage Repository, St. George's-road, Southwark, in the county of Surrey, for Improvements in bits.—Dated February 11, 1853. Sealed April 2, 1853.

227. BENJAMIN MITCHELL, of Romsey, in the county of Hants, Builder, for Improvements in the construction of artificial legs.—Dated October 5, 1852. Sealed April 5, 1853.

288. AUGUSTUS WALLER, of London, Doctor of Medicine, for Improvements in the measuring or ascertaining the quantity of alcohol and other substances in brandy, wine, beer, and other liquids.—Dated October 7, 1852. Sealed April 5, 1853.

302. WILLIAM TOWNLEY, of No. 2, Bartlett's-buildings, Holborn-hill, in the city of London, Engineer, for Improved machinery or apparatus for watering and flushing streets, squares, courts, and other localities.—Dated October 8, 1852. Sealed April 5, 1853.

284. GEORGE SIMPSON, of Manchester, in the county of Lancaster, Machine Maker, for Certain improvements in machines or apparatus for weighing.—Dated October 7, 1852. Sealed April 6, 1853.

324. WILLIAM RESTELL, of the Strand, in the city of Westminster, Watch Maker, for Certain improvements in chronometers, watches, and clocks, part of which improvements is applied to roasting jacks.—Dated October 9, 1852. Sealed April 6, 1853.

329. AUGUSTE EDOUARD LORADOUX BELLFORD, of No. 16, Castle-street, Holborn, in the city of London, for Improvements in the construction of revolving or repeating fire-arms.—Dated October 11, 1852. Sealed April 6, 1853.

313. JOHN EGAN, of William-street, in the county of the city of Limerick, for A self-acting flax scutching and hackling machine, with horizontal blades or hackles, an inclined plane on which flax holders move, the application of the fan by a current of air to press flax against scutching blades or hackles, and spring-catch flax holders, as per drawing.—Dated October 9, 1852. Sealed April 9, 1853.

344. SAMUEL PERKES, Civil Engineer, of No. 1, Walbrook, city of

London, for Improvements in certain apparatus and machines for the production and treatment of mineral and other substances, and part of which are applicable for other useful purposes.—Dated October 12, 1852. Sealed April 9, 1853.

346. SAMUEL PERKES, Civil Engineer, of No. 1, Walbrook, City of London, for Certain improvements in mines, buildings, and sewerage, for effecting sanitary purposes, and treating the produce therefrom.—Dated October 12, 1852. Sealed April 9, 1853.

397. HENRY MOSELEY, of Wandsworth, in the county of Surrey, for a machine to be driven by the pressure of a fluid, or to displace a fluid, or to measure it.—Dated October 15, 1852. Sealed April 9, 1853.

406. ANDREW BLAIR, of Mary Hill, in the county of Lanark, North Britain, Calico Printer, for Improvements in printing or ornamenting fabrics.—Dated October 15, 1852. Sealed April 9, 1853.

431. HENRY HUGHES and GEORGE FIRMIN, of Plough-road, Rotherhithe, in the county of Surrey, Manufacturers, for Improvements in the manufacture of lamp-black, and in recovering from such manufacture a substance suitable for fuel.—Dated October 18, 1852. Sealed April 9, 1853.

437. ARTHUR JAMES, of Redditch, in the county of Worcester, Manufacturer, for an Improvement or improvements in needle cases or wrappers.—Dated October 19, 1852. Sealed April 9, 1853.

477. HENRY CHARLES GOVER, of No. 9, Princes-street, Bedford-row, in the county of Middlesex, for Improvements in the apparatus used in printing with colours.—Dated October 21, 1852. Sealed April 9, 1853.

499. JAMES BRODIE, Clerk, of Bow of Fife, in the county of Fife, North Britain, for Certain improvements in the construction of sea-going vessels.—Dated October 23, 1852. Sealed April 9, 1853.

541. THOMAS WILKS LORD, of Leeds, in the county of York, Flax and Tow Machine Maker, for Improvements in safety and other lamps.—Dated October 27, 1852. Sealed April 9, 1853.

567. RICHARD ARCHIBALD BROOMAN, of No. 166, Fleet-street, in the city of London, for Improvements in violins and other similar stringed musical instruments.—Dated October 29, 1852. Sealed April 9, 1853.

572. HENRY BRINSMEAD, of the parish of St. Giles in the Wood, in the county of Devon, Machine Maker, for Shaking straw to be attached to thrashing machines.—Dated October 30, 1852. Sealed April 9, 1853.

626. CHARLES PHILLIPS, of the city and county of Bristol, Engineer, for Improvements in apparatus or machinery for reaping or cutting crops of corn or other crops, the cutting of which reaping machines are applicable.—Dated November 3, 1852. Sealed April 9, 1853.

640. MARC KLOTZ, of No. 77, Rue Rambuteau, Paris, Merchant, for An improved process and apparatus to be employed in ornamenting fabrics, leather, paper, and other surfaces.—Dated November 4, 1852. Sealed April 9, 1853.

876. JEAN HIPPOLYTE SALVAN, of Paris, Manufacturer, for Improvements in the manufacture of paletots and other articles of dress, the said improvements being obtained by an improved process of felting and fulling.—Dated November 26, 1852. Sealed April 9, 1853.

910. JULEA BARSE and PAUL GAGE, of Paris, for Improvements in

apparatus for manufacturing soda water and other aerated liquids, and likewise in the preparation of the substances employed therein.—Dated November 29, 1852. Sealed April 9, 1853.

1030. STEPHEN GREEN, of Princes-street, Lambeth, in the county of Surrey, for Improvements in joining earthenware tubes and pipes.—Dated December 11, 1852. Sealed April 9, 1853.

1167. JOHN ANDERSON, of Rugby, in the county of Warwick, Ironfounder, for Heating and ventilating apartments, and for remedying smoky chimneys by a radiant-ventilating grate.—Dated December 27, 1852. Sealed April 9, 1853.

27. FREDERICK ARNOLD, of Devonport, in the county of Devon, Ironmonger, for Improvements in heating the water in a bath or other vessel.—Dated January 5, 1853. Sealed April 9, 1853.

106. HIPPOLYTE CHARLES VION, of Paris, for Certain improvements in apparatus for refrigerating.—Dated January 15, 1853. Sealed April 9, 1853.

162. BENJAMIN QUINTON, of Birmingham, in the county of Warwick, Manufacturer, for A new or improved fastening for brooches and other articles of jewellery and dress.—Dated January 22, 1853. Sealed April 9, 1853.

171. HENRY BRINSMEAD, of the parish of St. Giles-in-the-Wood, in the county of Devon, Machine Maker, for Reaping all kinds of corn.—Dated January 24, 1853. Sealed April 9, 1853.

179. JOHN HENRY JOHNSON, of No. 47, Lincoln's-inn-fields, in the county of Middlesex, Gentleman, for Improvements in aerial navigation, and in the machinery or apparatus connected therewith.—Dated January 24, 1853. Sealed April 9, 1853.—(Communication.)

285. JOHN VERINDER KIDDLE, of No. 4, Elder-street, Norton Folgate, in the county of Middlesex, for Improvements in cocks or taps.—Dated February 2, 1853. Sealed April 9, 1853.

309. JOHN DUDGEON, of St. Michael's Chambers, No. 42, Cornhill, in the city of London, for Improvements in machinery used for raising propellers.—Dated February 4, 1853. Sealed April 9, 1853.

310. JACOB VALE ASBURY, of Enfield, in the county of Middlesex, Surgeon, for Improvements in railway carriages.—Dated February 4, 1853. Sealed April 9, 1853.

326. ALEXANDER PARKES, of Burry Port, in the county of Carmarthen, South Wales, for Improvements in the separation of certain metals from their ores or other compounds.—Dated February 5, 1853. Sealed April 9, 1853.

346. JOHN SEAWARD, of the Canal Iron Works, Poplar, in the county of Middlesex, Engineer, for Improvements in marine engines.—Dated February 9, 1853. Sealed April 9, 1853.

401. JOB CUTLER, of Birmingham, in the county of Warwick, Manufacturer, for Improvements in the manufacture of spoons and forks, and other similar articles for domestic use.—Dated February 16, 1853. Sealed April 9, 1853.

431. FRANK CLARKE HILLS, of Deptford, in the county of Kent, and GEORGE HILLS, of Lee, also in the county of Kent, Manufacturing Chemists, for Certain improvements in refining sugar, and in preparing materials applicable to that purpose.—Dated February 19, 1853. Sealed April 9, 1853.

433. CHARLES COWPER, of No. 20, Southampton-buildings, Chancery-lane, in the county of Middlesex, for Improvements in the

manufacture of oxide of zinc white, and in apparatus for that purpose.—Dated February 19, 1853. Sealed April 9, 1853.—(A communication.)

434. CHARLES NIGHTINGALE, of Wardour-street, Soho, in the county of Middlesex, Bedding Manufacturer, for Certain improvements in drying and heating certain substances or articles.—Dated February 19, 1853. Sealed April 9, 1853.

366. JOSEPH NASH, Chemist, of No. 3, Thames-parade, Pimlico, in the county of Middlesex, for The treatment and refining of sugar. —Dated October 13, 1852. Sealed April 13, 1853.

374. CHRISTOPHER HILL, of the Great Western Railway, Swindon, in the county of Wilts, for Improvements in the manufacture of lubricating matters.—Dated October 13, 1852. Sealed April 13, 1853.

375. GERARD ANDREW ARNEY, of Mitcham, in the county of Surrey, Gelatine Manufacturer, for Improvements in coating or enamelling pictures, prints, paper, and other surfaces.—Dated October 13, 1852. Sealed April 13, 1853.

379. JOHN HENRY LEE, of No. 31, Northampton-square, in the county of Middlesex, Ornamental Sawyer, for Improvements in sawing.—Dated October 13, 1852. Sealed April 13, 1853.

396. JAMES LOCHLEAD, of Kennington, in the county of Surrey, Manufacturer, and ROBERT PASSENGER, of Union-street, Southwark, in the same county, Merchant, for Certain improvements in the manufacture of glass and other vitrified substances, and in ornamenting and annealing the same.—Dated October 15, 1852. Sealed April 13, 1853.

417. PIERRE AUGUSTIN PUIS, of Paris, France, Gentleman, for An improved chain or cable, and an apparatus employed therewith for certain applications.—Dated October 16, 1852. Sealed April 13, 1853.

424. JOHN HENRY JOHNSON, of No. 47, Lincoln's-inn-fields, in the county of Middlesex, Gentleman, for Improvements in drying, and in the machinery or apparatus to be used therein.—Dated October 18, 1852. Sealed April 13, 1853.

443. WILLIAM CHISHOLM, of Holloway, in the county of Middlesex, Chemist, for Improvements in obtaining caustic, soda, and other substances from the residues of articles used in the application of gas. —Dated October 19, 1852. Sealed April 13, 1853.

484. GEORGE ELLINS, of the borough of Droitwich, in the county of Worcester, for An improved method and apparatus for dressing and cleaning flax-straw.—Dated October 22, 1852. Sealed April 13, 1853.

526. JAMES NASMYTH, of Stafford-street, Bond-street, in the county of Middlesex, Engineer, for An improved mode of utilizing running waters.—Dated October 26, 1852. Sealed April 15, 1853.

527. JOSEPH CHARLES FREDERICK BARON DE KLEINSORGEN, of Little New-street, in the city of London, for An improved apparatus for indicating the variation of the magnetic-needle.—Dated October 26, 1852. Sealed April 15, 1853.

537. ROBERT WILLIAM BERTOLACCI, of No. 45, Rue d'Amsterdam, Paris, for An improved pneumatic ink and pen-holder.—Dated October 27, 1852. Sealed April 13, 1853.

546. JAMES NASMYTH, of Stafford-street, Bond-street, in the

county of Middlesex, Engineer, for Improvements in the mode of obtaining and applying motive power. — Dated October 27, 1852. Sealed April 13, 1853.

634. EMILY PETTIT, of No. 10, Brompton-crescent, Brompton, in the county of Middlesex, Spinster, for A musical instrument, which she calls a "Euphotine."—Dated November 4, 1852. Sealed April 13, 1853.

649. ANDREW LAWSON KNOX, of Glasgow, in the county of Lanark, North Britain, Manufacturer, for Improvements in the manufacture or production of ornamental fabrics. — Dated November 5, 1852. Sealed April 13, 1853.

784. ROBERT WALKER, of Glasgow, in the county of Lanark, North Britain, Merchant, for Improvements in the construction of portable houses and other erections. — Dated November 19, 1852. Sealed April 13, 1853.

936. JOHN NORTON, of Cork, in the county of Cork, Esquire, for Improvements in shot or projectiles. — Dated December 2, 1852. Sealed April 13, 1853.

1209. THOMAS BENJAMIN SMITH, of Bristol, for Improvements in calcining certain ores and in the construction of furnaces for that purpose, and for converting certain products arising in the process into an article of commerce not heretofore produced therefrom. — Dated December 31, 1852. Sealed April 13, 1853.

13. LAZARE FRANÇOIS VAUDELIN, of Upper Charlotte-street, Fitzroy-square, in the county of Middlesex, for Improvements in apparatus for retarding and stopping railway carriages.—Dated January 3, 1853. Sealed April 13, 1853.

102. FREDERICK JOSEPH BRAMWELL, of Millwall, Engineer, and ISHAM BAGGS, of Liverpool-street, Engineer, both in the county of Middlesex, for Improvements in steam-machinery used for driving piles, hammering, stamping, and crushing.—Dated January 14, 1853. Sealed April 13, 1853.

255. EDMUND LEACH, of Rochdale, in the county of Lancaster, Machine Maker, for Improvements in the mode or method of preparing and spinning cotton, wool, flax, and other fibrous substances, and in the machinery or apparatus employed therein.—Dated January 31, 1853. Sealed April 13, 1853.

324. JOHN CAMPBELL, of Bowfield, in the county of Renfrew, North Britain, Bleacher, for Improvements in the treatment or finishing of textile fabrics and materials.—Dated February 5, 1853. Sealed April 13, 1853.

327. EDWARD PALMER, of Woodford-green, in the county of Essex, for Improvements in carriages used on railways.—Dated February 5, 1853. Sealed April 13, 1853.

348. CHARLES ILES, of Peel Works, Birmingham, for Improvements in pointing wire.—Dated February 10, 1853. Sealed April 13, 1853.

349. JOHN WEBSTER, of Ipswich, for Improvements in treating animal matters, and in manufacturing manure.—Dated February 10, 1853. Sealed April 13, 1853.

360. GEORGE HUTCHINSON, of Glasgow, in the county of Lanark, Merchant, for Improvements in treating oils and other fatty matters. —Dated February 10, 1853. Sealed April 13, 1853.

365. SIR JAMES MURRAY, Knight, Doctor of Medicine, of Dublin, for Improvements in deodizing cod-liver oil, in rendering it more

agreeable and easier to use, either by itself or mixed, and so as to be capable of being administered in larger quantities, and with greater success.—Dated February 20, 1853. Sealed April 13, 1853.

396. WILLIAM BLISSETT WHITTON and GEORGE SAMUEL WHITTON, of No. 18, Princes-street, Lambeth, in the county of Surrey, for Improvements in the manufacture of sewer and other pipes.—Dated February 15, 1853. Sealed April 13, 1853.

403. GEORGE GRAY MACKAY, of Grangemouth, near Falkirk, North Britain, Managing Proprietor of the Grangemouth Coal Company, for Improvements in the construction of drain pipes.—Dated February 16, 1853. Sealed April 13, 1853.

407. JOHN GEORGE PERRY, of No. 12, Westbourne-street, Hyde-park-gardens, for Improvements in bookbinding, to facilitate the finding of places in books.—Dated February 16, 1853. Sealed April 12, 1853.

405. ALLAN EDWIN HEWSON, of Birmingham, in the county of Warwick, Japanner, for Certain improved modes or processes for making buttons, beads, and other ornaments of dress.—Dated October 15, 1852. Sealed April 14, 1853.

421. CHARLES REEVES, junior, of Birmingham, in the county of Warwick, Manufacturer, for An improvement or improvements in the manufacture of knives.—Dated October 18, 1852. Sealed April 16, 1853.

422. GEORGE RANDFIELD TOVELL, of Mistley, and JOHN MANN, junior, Esquire, Justice of the Peace, of Colchester, both in the county of Essex, for Improvements in the construction of ships and other vessels.—Dated October 18, 1852. Sealed April 16, 1853.

421. WILLIAM HARCOURT and JOSEPH HARCOURT, of Birmingham, in the county of Warwick, Brassfounders, for Certain improvements in the construction and manufacture of match-boxes.—Dated October 18, 1852. Sealed April 16, 1853.

436. ROBERT MOLE, of Birmingham, in the county of Warwick, Manufacturer, and ROBERT MOLE, junior, of Birmingham aforesaid, Manufacturer, for Improvements in the manufacture of swords and matchets.—Dated October 19, 1852. Sealed April 16, 1853.

444. GABRIEL BENDA, of Basinghall-street, in the city of London, Merchant, for Improvements in apparatus for obtaining fire for smokers.—Dated October 19, 1852. Sealed April 16, 1853.

454. CHARLES CLARKE, of No. 43, Preston-street, Brighton, county of Sussex, Engineer, and JOHN GILBERT, of No. 10, Hyde-place, Hoxton, county of Middlesex, Plumber, for Improvements in the supply and distribution of water and other fluids.—Dated October 20, 1852. Sealed April 16, 1853.

462. JACOB TILTON SLADE, of Pall-mall, in the county of Middlesex, Gentleman, for An improved hoisting apparatus.—Dated October 20, 1852. Sealed April 16, 1853.

470. WILLIAM LUKYN, the elder, of Broad-street, in the city of Nottingham, Dentist, for A liquid draught detector or self-measuring tube, with a union conveyance tap, and its stock and time table.—Dated October 21, 1852. Sealed April 16, 1853.

473. JULIAN BERNARD, of Guildford-street, Russell-square, in the county of Middlesex, Gentleman, for Improvements in the production of ornamental surfaces upon leather.—Dated October 21, 1852. Sealed April 16, 1853.

486. Julien Boilesir, of No. 4, North-terrace, Brompton, Engineer, for An improved mode of preserving vegetable substances and animal coatings.—Dated October 22, 1852. Sealed April 16, 1853.

495. David Crichton, of Manchester, in the county of Lancaster, Machine-maker, for Arrangements and apparatus for producing continuous circular motion, giving a series of different velocities obtained from alternate motions applicable to looms, and other machines.—Dated October 23, 1852. Sealed April 16, 1853.

504. George Kennedy Geyelin, of Camden-town, London, for An improved machine for grinding pigments or other vegetable or mineral substances.—Dated October 23, 1852. Sealed April 16, 1853.

547. James Henry Smith, of Connaught-terrace, London, for Improvements in corsets.—Dated October 27, 1852. Sealed April 16, 1853.

302. William Brown, of Birmingham, in the county of Warwick, Clerk of Works, for An improvement or improvements in the construction of metallic bedsteads.—Dated February 4, 1853. Sealed April 16, 1853.

305. Philip Webley, of Birmingham, in the county of Warwick, Manufacturer, for Improvements in repeating pistols and other firearms.—Dated February 4, 1853. Sealed April 16, 1853.

375. George Lee Lysnar, of No. 85, Park-street, Grosvenor-square, in the county of Middlesex, for Improvements in swivel-hooks, and such like fasteners.—Dated February 12, 1853. Sealed April 16, 1853.

395. Alphonse Rene le Mire de Normandy, of Judd-street, in the county of Middlesex, for Improvements in the manufacture of articles made of gutta percha.—Dated February 12, 1853. Sealed April 16, 1853.—(Partly a communication.)

406. Edouard Sy, of No. 17, Clifford-street, Bond-street, in the county of Middlesex, for Improvements in book-binding.—Dated February 16, 1853. Sealed April 16, 1853.

422. Isaac Frost, of No. 49, Tavistock-terrace, Upper Holloway, in the county of Middlesex, for Improvements in reaping or cutting crops. —Dated February 17, 1853. Sealed April 16, 1853.

428. Henry Noad, of No. 7, Langthorn-street, Stratford, in the county of Essex, for Improvements in treating corn or grain, and obtaining products therefrom.—Dated February 18, 1853. Sealed April 16, 1853.

446. Benjamin Barton, of Old Kent-road, in the county of Surrey, Ironmonger, for An improved bath, which can also be used as a life-boat.—Dated February 21, 1853. Sealed April 16, 1853.

448. John Davie Morries Stirling, of the Larches, near Birmingham, in the county of Warwick, for Improvements in the manufacture of wire.—Dated February 21, 1853. Sealed April 16, 1853.

450. James Hudson, of Halifax, and Thomas Bamford Hudson, of Malton, both in the county of York, for Improvements in the manufacture of bricks, tiles, and drain pipes, or tubes.—Dated February 22, 1853. Sealed April 16, 1853.

464. William Spence, of No. 50, Chancery-lane, in the county of Middlesex, for Certain improvements in machines for thrashing and winnowing corn and other agricultural produce.—Dated February 24, 1853.—Sealed April 16, 1853.—(A Communication.)

439. Martin Walter O'Byrne and John Dowling, both of No.

17, Burr-street, in the county of Middlesex, Machinists, for A machine for cutting paper, mill-board, leather, vellum, sheet metals, and other suitable materials, for useful and ornamental purposes.—Dated October 19, 1852. Sealed April 19, 1853.

445. GEORGE GOTCH, of King's-street-terrace, Islington, in the county of Middlesex, Machinist, for Certain improvements in transmitting intelligence upon railways.—Dated October 19, 1852. Sealed April 19, 1853.

449. JOHN JONES, of Sheffield, in the county of York, Manufacturer, for Improvements in handles for knives, razors, and other like instruments.—Dated October 19, 1852. Sealed April 19, 1853.

461. THOMAS HENRY BIDDLES, of Mansfield-road, Nottingham, Lace Manufacturer, and JOHN WILLIAM DUPHRATE, of Radford, in the county of Nottingham, Mechanic, for Improvements in machinery for the manufacture of textile and looped fabrics.—Dated October 20, 1852. Sealed April 20, 1853.

535. JAMES CONRY, of Manchester, in the county of Lancaster, Umbrella and Parasol Manufacturer, for Improvements in umbrellas and parasols.—Dated October 27, 1852. Sealed April 20, 1853.

607. FRANCIS DANIELL, of Camborne, in the county of Cornwall, Analytical Chemist, for Improvements in stamp heads.—Dated November 1, 1852. Sealed April 20, 1853.

631. HARRISON BLAIR, of Colthurst, in the parish of Mitten, and county of York, for Improvements in apparatus for supplying steam-boilers with water.—Dated November 3, 1852. Sealed April 20, 1853.

728. GEORGE STENSON, of Northampton, Engineer, for Improvements in apparatus for separating gold from auriferous sand and earth. —Dated November 12, 1852. Sealed April 20, 1853.

730. GEORGE PHILCOX, of No. 3, Winchester-buildings, London, Chronometer Maker, for Improvements in marine chronometers and other time-keepers.—Dated November 13, 1852. Sealed April 20, 1853.

731. EDWARD DAVY, of Crediton, in the county of Devon, Manufacturer and Merchant, for Improvements in the preparation of flax and hemp.—Dated November 13, 1852. Sealed April 20, 1853.

743. PETER FORBES, of Shettleston, in the county of Lanark, North Britain, Millwright, for Improvements in sowing or depositing seeds in the earth.—Dated November 13, 1852. Sealed April 20, 1853.

783. JAMES POTTER, of Manchester, in the county of Lancaster, Machinist, for Improvements in machinery for spinning cotton and other fibrous substances.—Dated November 19, 1852. Sealed April 20, 1853.

811. BENJAMIN WALKER and WILLIAM BESTWICK, of Salford, in the county of Lancaster, Braid Manufacturers, for Improvements in the manufacture of braid, and the machinery or apparatus employed therein.—Dated November 22, 1852. Sealed April 20, 1853.

949. JOHN BETHELL, of Parliament-street, in the city of Westminster, Gentleman, for Improvements in steam-engines.—Dated December 3, 1852. Sealed April 20, 1853.

986. JAMES NORTON, of Ludgate-hill, in the city of London, Gentleman, for An improved mode of transmitting motive power.—Dated December 7, 1852. Sealed April 20, 1853.

1082. ARCHIBALD SLATE, of Woodside Iron Works, near Dudley, in the county of Worcester, Civil Engineer, for An improvement in propulsion.—Dated December 16, 1852. Sealed April 20, 1853.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 6. Vol. XXI. ENLARGED SERIES.—JUNE, 1853.

Specification of the Patent granted to Moses Poole, *of Serle-street, in the County of Middlesex, Gentleman, for Improvements in Machinery for Mowing and Reaping.*— Sealed October 2, 1852.—(Communication from Obed Hussey, of America.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— The reaping and mowing machine heretofore patented by me consists of a frame of wood with the driving-wheel running between the side pieces of the frame. In bolting the cutter-bar to the frame of such a machine it must necessarily cross the frame, either before or behind the wheel. The improvement hereinafter described is as follows:—

Description of the Drawing.

The frame, *a*, in this improvement is of cast or wrought iron or other metal. It consists of two side plates of a size and shape suitable for the attachment thereto of the axles of the cog-wheels, and crank, and the cutter-bar, &c.

The length of the side plates may be four feet, more or less, and from six to twelve inches wide, more or less. The braces by which these side plates are secured together may be cast solid to one of the plates or they may be cast separately, and bolted to both plates, so as to secure them firmly together, twelve inches apart, more or less. The cog-wheels and crank are similar to those described in my former patent, but in this improvement they are all placed between the two side plates of the frame, where they are securely protected from danger of clogging by contact with the ground by a plate of iron, *b*, which closes the space between the lower edges of the side plates and under the said cog-wheels.

The main axle extends beyond the frame to receive the driving-wheel which runs entirely outside the frame. In this position the soil which accumulates upon it in wet weather cannot obstruct its own motion, as heretofore, or affect the cog-wheels by falling upon them.

In this improvement the cutter-bar, *c*, is secured to the frame in such a position as to bring the cutting apparatus nearly in a line with the main axle, so that in crossing ridge and furrow the main wheel and cutters may rise and fall together.

The position of the cutters may be varied from the line of the main axle to any point within the circumference of the main wheel. The nearly central position of the cutters, as above described, removes a difficulty heretofore experienced and is claimed as novel. The cutter-bar is secured to the under side of the frame as usual, it may be of wood, or partly of wood. If it be of wrought-iron an offset downward is made in the bar between the frame and the first cutter, so that the part of the cutter-bar to which the cutting apparatus is attached shall be about two inches, more or less, lower than that part of it which is bolted to the frame.

The purpose of the offset is, that when the cutters are near the ground the frame may be of any required distance from the ground.

The cutter-bar may be of cast metal and of the form above described, with projections behind at the extreme end to receive the truck-wheel.

The fingers may be made of cast-iron. I am aware that cast-iron fingers have been before made, but I claim as

novel the chilling of the surface of the slits in them through which the cutters play in order to procure a hard surface.

When the machine is used for mowing grass the truck-wheel may be dispensed with, allowing the seed-runner under the extreme end of the cutter-bar to slide on the ground when the machine is required to cut very near the ground.

When corn is to be cut and dropped in sheaves, a platform of boards must be placed in the rear of the cutter-bar of convenient size for the corn to fall on and form the sheaf, from this platform the sheaves are pushed off as from other reaping machines. The size of the platform must be varied according to circumstances. If the corn be very dry the rear of the platform must be raised to prevent its slipping off too soon, if it be wet the platform must be reduced in width and restored to its horizontal position, so that the heavy sheaf may be easily removed.

The sheaves may be pushed off behind, as usual, in my ordinary machines, or a board several feet long may be fixed edgewise on the platform, one end of which should be fixed near the truck-wheel and crossing the platform at any required angle.

The machine is altered to cut a high or low stubble by shifting the bolts which confine the main axle-boxes into different holes. The change is made at the truck-wheel by changing the pin from one hole to another

This machine may be provided with single horse shares connected with the iron frame, or forward wheels may be used, with shares attached to them for a single horse, or a pole for two horses abreast.

Another point claimed as novel in this improvement is the spurs fixed to the under side of the cutters and projecting downwards and playing in the cavities in the upper side of the fingers under the cutter-rod, for the purpose of driving out the foul matter, which may pass in and accumulate under the cutters and impede their free action.

The novelties here claimed are:—

First, the placing of the main drawing-wheel on the outside of the frame in which the crank and cog-gearing is hung.

Secondly, the placing the cutting apparatus parallel and nearly in a line with the centre of the driving-wheel or vary-

ing to either side of such centre within the circle of the circumference of the driving-wheel.

Thirdly, I claim the offset downwards in the cutter-bar either of wrought or cast-iron, or other material, between the frame and the first cutter nearest the frame, for the purpose of bringing the cutters near the ground while the frame shall be far above the ground.

Fourthly, I claim the chilled surface of the slit through the fingers.

Fifthly, I claim the spurs fixed to the under side of the blades for the purpose of clearing out the filth which often collects under the blades and tends to impede their free action.—In witness, &c.

MOSES POOLE.

Filed April 2, 1853.

Specification of the Patent granted to CHARLES ARTHUR REDL, *of No.* 27, *Davies-street, Berkeley-square, in the County of Middlesex, for Improvements in Telegraphing or Communicating Signals at Sea, and otherwise.*—Sealed October 28, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of employing a system of collapsing cones or other formed bodies, the significations depending on the positions of the cones, and which are not for the time being expanded, and the code used therewith may be that which is now employed by the Admiralty or otherwise. And as the cones or bodies cannot be seen at night it is necessary to employ lanterns so constructed and worked as to intimate when the particular cones or bodies are expanded or contracted, and this is best accomplished by the use of one or more lanterns, according to my invention, having cylinders of different coloured glass, and shades capable of movement by cords or bodies, in like manner to the cones when at the masthead or other support of the cones or bodies and lanterns.

Telegraphic communications at sea and between the sea and shore are carried on at present by a combination of flags and balls by day, and by means of coloured lights at night.

Flags in most favourable circumstances cannot be seen when end on, and a calm, rain, haze, or a bright sun are great obstacles; the combination of flags with balls partakes of the former disadvantages, whilst balls by themselves afford only limited combinations, on account of their uniformity of shape.

The present night signals by coloured lights require several lanterns to be capable of the necessary combinations, and the continual hauling up and down is a great loss of labour and time. The number of lanterns employed, the lightness required, and the regard for economy, have reduced the light therein used to the lowest standard of intensity.

There is no substitute in case of atmospheric obstacles or want of proper signal lanterns, and the signals are at the best uncertain on account of the different distances to which the different coloured glasses transmit the light.

The night signals are totally distinct, and are carried on by a different system from the day signals.

The object of my invention is to remedy these defects and to establish one system of communication which may be carried on the same under all circumstances.

First, I make communication by day by means of an opaque and collapsing body, which remains a fixture during the communication—the body best adapted to such communications is a cone, which when opened shows in all directions a triangle. According to circumstances I construct these cones:—

a, with elastic springs; *b*, with brails; *c*, on the telescope principal.

a, elastic cone. The hoop, *a*, figs. 1, 2, and 3, is a fixture on the middle of the rope, *b;* the two smaller hoops, *d* and *c*, figs. 1 and 2, travel up and down both ends of *b;* they are connected with *a* by a number of Hodges' patent accumulators, *f*, *f*, *f*, figs. 1, 2, and 3.

The coats, *g*, fig. 4, of any soft and dark material, are fastened to *c*, *d*, and *a;* they have a number of sheaths, *h*, fig. 4, for the reception of the accumulators.

To go home and to work better on the mast a part of the cone, A, B, fig. 2, is cut out, and the hoop, *a*, is provided with a roller, *m*, fig. 2, and stays, *k*, fig. 1.

b, the cone with brails, is represented in figs. 1 and 2. If brails are substituted for elastic springs, *c* and *d*, have

both an "up" and a "down haul," and the rope, *b*, in consequence, a double-block.

The coats have parallel strengthening-bands, *y*, *y*, figs. 1 and 2, in lieu of the sheaths.

Small ropes—brails, *l*, *l*, figs. 1 and 2, are passed through a number of thimbles or rings fastened to these bands and joined to each closing haul in such a manner as to gather up the coats when short.

c, telescope cones; figs. 5 and 6, may be constructed when weight is no impediment and durability an advantage. They are constructed on the telescope principle from metal or any suitable substance; they may be worked either with one haul and their own weight, or with an up and down haul, and to add to strength, the flanges, *m*, *m*, fig. 6, for collecting the preceding rings may be formed into cross-bars.

Secondly, for night signals I use a light of considerable intensity which remains stationary during the communication, being capable of showing the different colours at pleasure, and providing at the same time the necessary compensation for the different powers of transmission.

The change of colour, if coloured lights are used, is effected by making coloured glass tubes travel up and down the stationary light within the lantern, by means of springs or any other mechanical contrivance.

These tubes may either move for themselves one in the other, as in fig. 8, or together on the top of each other, as shown in fig. 9.

The coloured glass tubes, *a* and *b*, fig. 8, travel up and down the tubes, *c* and *d*, and are fastened to the ring, *k*, figs. 8 and 10, by means of the guides, *l*, *l*, which move in slides, *m*, fig. 10.

They are secured with leather or cork or any elastic substance, as shown in fig. 10, and are stayed when travelling up by means of the buffers, *n*, figs. 8, 9, and 10.

Thus by means of two coloured glass tubes the different changes are produced.

The compensation is effected by the compensation string, *p*, fig. 8, so proportioned that if *a* and *b*, be pulled together, they may reduce the field of light to the proper dimension.

The next stronger light is reduced by a stop in the haul-down of its neighbour.

In fig. 11, the glass tubes are kept in their position by three metal rods, *r;* four changes may be produced in this lantern by two coloured glass tubes and one dark shade; for the compensation a third glass tube of ground glass may be added, and each change provided with its own down-haul.—In witness, &c.

CHARLES ARTHUR REDL.

Filed April 27, 1853.

Specification of the Patent granted to JOSEPH BARKER, *of Kennington-lane, in the County of Surrey, for Improvements in Fastenings.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of employing for each fastening two half-screws, one half being affixed to one part of a bedstead or other frame or article, and the other half to the other part, so that when brought together the fastening is complete by the use of a nut or nuts. And in order that my invention may be most fully understood, and readily carried into practice, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a plan and section of two parts of the frame of a bedstead, coming together at right angles, and combined and secured according to my invention; and

Fig. 2, shows the parts separately.

Fig. 3, shows a side view; and

Fig. 4, a plan of like means of connecting two rails when they come together end to end.

Fig. 5, shows a plan.

Fig. 6, a side view.

Fig. 7, an end view of a fastening, the parts of which are not permanently fixed to the rails; and

Fig. 8, shows the two parts of the fastening, which are applied to one rail separately.

In all these figures the same parts are indicated by the same letters of reference. *a, a,* are the rails, or parts of rails, to be connected or joined together; *b, b,* are the halves of screws, which are respectively affixed to the rails,

a, *a*, when the rails are to be combined according to figs, 1, 2, 3, and 4, whether they come together at a right angle or other angle, or end to end. In bedsteads and other frames, where uprights are required, the nuts are formed or fixed in the ends of the uprights, *c*, *c*, as shown at fig. 1; but where no uprights are required, then screw-nuts, *d*, *d*, such as shown at figs. 3 and 4, are employed to bring and retain the parts together. In respect to the fastening shown at figs. 5, 6, 7, and 8, it differs only from the preceding ones inasmuch as the half-screws are not absolutely affixed to the rails; but the parts b^1, b^1, in which the screws are held, are fixed to the rails, and the half-screws are formed as shown, so that they fit into the parts, b^1, b^1, and then receive the screw-nuts to bind the parts together.

I would remark, that the parts above described may be of wood or metal; but for most purposes, whether the rails be of wood or metal, I believe it will be desirable to employ metal screws and metal nuts.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that I do not confine myself to the details as shown, so long as the peculiar character of the invention be retained.

But what I claim is, the combination of parts herein described.—In witness, &c.

JOSEPH BARKER.

Filed April 1, 1853.

Specification of the Patent granted to JOSEPH BARRANS, *of Queen's-road, Peckham, in the County of Surrey, for Improvements in Steam-Engine Boilers.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists of applying cup-formed vessels opening into the fire-box, so as to extend or increase the heating surface, such cups being either fixed only to the inner plates of the fire-box, or to the inner and outer ones, so as to act as stays, as well as means of increasing the heating surface. And in order that my invention may be

most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a longitudinal section of part of a steam-boiler having my improvements applied thereto.

Fig. 2, is a transverse section through the fire-box of the boiler.

Fig. 3, is a horizontal section thereof.

Fig. 4, shows a horizontal section of part of the fire-box, showing the parts half size. In this arrangement the cups, *a*, *a*, form part of the inner plate of the fire-box only, and the inner and outer plates are connected by stays.

In fig. 5, the cups, *a*, *a*, are fixed into the inner plate, *c*, of the fire-box, as shown. And it will be evident that by thus using a number of cups the heating surface of the firebox exposed to the water in the boiler will be greatly increased. In this arrangement, one of the cup-formed vessels is shown fixed so as to form a stay for the two plates, the inner and the outer one, and is fixed to the inner plate, *c*, by driving a short ring or tube into it, so as to expand it into the hole in the plate, *c*. The cup is formed with a projection, by which it is fixed to the outer plate, *d*, by riveting as shown; and one of the cups are shown to be fixed by riveting, at *e*, and another by screw and rivet, at *f*.

I would, however, remark that I do not confine myself to the modes of fixing the cup-formed vessels to the plates, whether by screws, rivets, and wedges, or otherwise, as the same may be varied. The best means I am acquainted with for constructing the inner plate with its cupped recesses is to cast it of copper, or other suitable metal; and in order to close the grain of the cast metal, to subject it to pressure between dies.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details as herein shown and described, as the same may be varied, without departing from my invention.

But what I claim is, the application of cup-formed vessels to steam-boilers, as herein described.—In witness, &c.

JOSEPH BARRANS.

Filed April 1, 1853.

Specification of the Patent granted to Henry Gardiner Guion Jude, *of Lower Copenhagen-street, Barnsbury-road, Islington, in the County of Middlesex, for Improvements in the Manufacture of Type.*—Sealed September 23, 1852. (Communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— The invention communicated to me relates, in the first place, to improvements upon that manufacture of type set forth in the specification of a patent granted to Phillipe Porrier de St. Charles, on or about the first day of July, 1845, according to which specification the type or printing surfaces are formed by compression, the body of the type being formed simultaneously therewith, for which the requisite quantity of metal is cut from a rod or strip of the proper size. Now it is found that some difficulty exists in the manufacture of type according to the specification of Phillipe Porrier de St. Charles's invention, inasmuch that it is troublesome to obtain the proper size of blank which shall insure sufficient exactitude and uniformity of size required in the finished type. For instance, supposing the blank to contain a slight excess of metal, it is impossible to compress it to the exact same size as a smaller blank, although some portion of the metal escapes at the matrix (the compression chamber being subject to the same influences in each case). Thus types so formed are not of exact and uniform body. To obviate this, I form a longitudinal groove or indentation on one or both sides of the wire, or strip of metal, from which the blank is cut, as represented longitudinally at fig. 1^a, and in cross section at fig. 2^a, or it may be formed in the blank subsequently; blanks thus produced have a sufficient area in cross-section to fill the angles of the chamber in which they are compressed. In event of the blanks containing too great an excess of metal (which must always be the case in some degree), it is compressed into the space occupied by the grooves or indentations in the sides of the type, which become thereby reduced, but enables the metal to offer a uniform degree of resistance, thus causing the different types to be formed by compression under an equal degree of pressure, which ensures great accuracy and uniformity in the body of such type.

The second part of this invention has reference to the

manufacture of type formed partly by pressure, and partly by casting, or other means, that is to say, the letter or character forming the face of the type is produced by pressure in a matrix, such face having the body of the type attached thereto at a subsequent operation. I may here state that I am aware types have been before produced by attaching a face or character of metal to a body separately formed of metal or other material, and also that type have received a coating or surface of a different metal by means of electrical deposit; but, in all such instances, the face or character of the type have been produced in the ordinary manner of type-founding. According to these improvements I produce the letter, vignette, or ornament forming the type face by pressure, as will be hereinafter described, and I afterwards attach a body to such face by means of casting and soldering, or otherwise. By this means I produce a better article, and at the same time effect considerable saving, by forming the letter or character of copper, or other metal best adapted for the purpose, while the body of the type is of inferior metal. I am also enabled to render the metal of the face or character much harder, there being only a small portion or thickness of metal between the pressure surfaces, which increased hardness not only conduces to the lasting properties of the type, but takes sharper and finer impressions. The apparatus by which I manufacture the letter, vignette, or other device of the type is represented in the annexed sheet of drawings, in the several figures of which the same letters of reference are used to denote the same parts where they recur.

Fig. 1, exhibits this apparatus in front elevation; and

Fig. 2, a transverse vertical section of the same.

Fig. 3, a plan of the die or matrix on an enlarged scale; and

Fig. 4, a side view of the matrix and pressing surface, or "force," partly in section. By this apparatus the type faces or letters are produced from a strip of metal, of about one-eighth of an inch in thickness, more or less. This is fed into the machine, which cuts it into pieces of the proper size, places it in position to be struck by the matrix, and delivers the type, vignette, or other printing surface, which is attached at a subsequent process to the "body," as will be hereinafter explained. A, A, is the framing which is similar to a double-armed pass, the bed-plate or base of which receives the bed, B, containing the matrix, C, in which

the metal is to be struck to receive the impress of the character or letter; D, is the "force," or nose-piece, which acts upon the metal, it is supported by a cylinder, E, which slides vertically between two V guides, maintaining the parallelism of its motion. These guides are secured and adjusted to the framing by the bolts and screws, as shown; F, is the main shaft fitted to bearings in the side frames, it also has abutments, f^1, f^1, near the middle, to take the upward pressure consequent on its action; G, is a strip of copper or other metal, of a width suitable for the size of the letter or device to be struck. This is previously coiled on a drum, H, and is conducted thence between a pair of feeding-rollers, I, I, which communicate a certain determined amount of motion at each revolution of the shaft. These rollers are actuated by means of a lever, which oscillates on a shaft, L, mounted in bearings on the framing; the lower end of this lever carries a paul, *a*, which takes effect on a ratchet-wheel, M. The position of the paul, *a*, is regulated by an adjusting screw, *b*, which takes effect on the paul-carrier, *c*, jointed to the lever, K, the bolster, *d*, of *b* being a fixture to that lever. By adjustment with the screw, *b*, the position of the paul can be regulated so as to take one or more teeth of the ratchet at each forward movement, which will depend on the length of strip, G, to be delivered at each operation. The lever, K, is acted on by the cam, N, effecting contact with the roller, *e*, fitted to that lever. The cam, N, also gives the reciprocating motion to the sliding cylinder, E, by taking effect on the lever, K, at *f*, which is interposed between it and the cylinder on which it exerts a downward pressure; a bridle or shakel, P, connects the cylinder, E, with the lever, K, the upward motion given to which lever carries with it the cylinder. The strip of metal, G, projected forwards by the feeding-rollers advances towards a pair of cutting knives, *g*, *h*, one of which, *g*, is fixed to the bed, B, and is consequently stationary, while the other, *h*, is affixed to the lower end of the cylinder, E, and descends with it. In its descent this knife, *h*, severs a portion of the metal strip, G, which is subsequently operated upon in the matrix. The position of the knives and their cutting action is best seen in fig. 6, which shows those parts in side elevation. The piece of metal separated from the strip, G, is now to be impressed with the letter, device, or vignette, for which purpose it is traversed sideways by a guide apparatus, separately shown in section at fig. 5, and in the plan, fig. 3.

This apparatus consists of a sliding-frame, U, which embraces the severed piece of metal. The frame, U, is fitted with a moveable piece, *i*, adjusted by means of two screws, K, K, to the size of the metal piece cut off. The strip, G, bears against a guide-piece, S, and is held in position by a pin or other suitable stop inserted in one of the holes, *l*, *l*, according to the width of the metal. The guide-frame, V, has a traverse motion imparted to it by the lever, T, best seen in fig. 1. This lever, T, is pivoted at *l*', and acted on by a cam, *m*, fixed to the main shaft, F, immediately after the rising of the cylinder, E. The traverse motion of V, carries forward the piece of metal, and places it over the letter or device into which it is to be impressed, and is represented by the letter R, in the matrix, C. In order to keep the severed piece of metal correctly in position, a finger piece, W, passes under the fixed blade, *f*, and with the finger piece, *i*, conducts the piece of metal to its proper position. The knives, *g* and *h*, finger, *i*, and piece, W, are all adjustable so as to be varied according to the superficies of the piece of metal to be acted on. An adjusting screw, X, is also fitted to the sliding-frame, U, in order to alter its traverse, which depends on the breadth of strip, G, to be acted on. The motion of lever, T, is uniform, and represented as acting throughout its full extent. In order to reduce the motion communicated to U, the screw, X, is caused to recede from the tail of lever, T, and according to the position of the screw so will be the extent of motion. The lever, T, taking effect on the screw-head advances the slide-frame, U, the withdrawal being effected by the return of lever, T, acting on the cross-bar, *p*. The lever, T, is acted upon once at each revolution of the shaft, F, by cam, *m*, producing the advance motion, while a spring, *r*, causes it to recede immediately it is released by cam, *m*; Y, is a vertical shaft, supporting a horizontal arm, *z*, which carries a small shovel, *s*, this receives the metal piece after it is struck, and deposits it in a suitable receptacle. The shaft, Y, has a short arm, *q*, acted on by a cam, *t*, fixed to the main shaft, which throws the shovel, *s*, into the position shown by dotted lines in fig. 3. The matrix, C, is produced in steel by stamping with a suitable punch according to the letter or device required, which is formed of a depth about equal to the counter in the same kind of type, or in general terms to about half the depth of ordinary characters. The

matrix is rendered smooth on the surface and hardened. It is fixed securely in its position, as shown in fig. 3. A[1], is a ratchet and paul, to prevent the machine being driven in the wrong direction.

The action of the machine is as follows:—the strip of copper or other metal having been wound on the drum, H, and delivered between the feed-rollers, I, I, is brought up to the stop when the machine is set in motion in the direction of the arrow. The cam, N, first brings down the cylinder, E, by acting on the point, *f*, as explained. The downward movement of E causes the knife, *h*, to cut off the length of metal which falls on the face of the bed between the fingers, W and *i*. The continued motion of shaft, F, carries the cylinder, E, upwards, the cam, N, lifting the lever, K, at *e*, on the rise commencing the cam begins to take effect on lever, T, causing the advance of slide U, which carries forward the piece of metal and deposits it on the matrix into which it is to be struck. The slide, U, is brought sharply back by its spring, *i*. The continued upward movement of lever, K, then advances the metal strip as before explained in readiness for the succeeding stroke. The nose or "force," D, on again descending takes effect on the piece of metal now interposed between it and the matrix, compressing it forcibly, as seen at fig. 4, which causes it to assume and bear in relief the character or device of the matrix. At the same time a second piece of metal is cut off for the succeeding operation. The "force," D, is made in two parts, *u*, *v*, one, *u*, of which is fixed firmly in the cylinder, E; the other piece, *v*, is fitted loosely to *u*, and sustained by two steady pins seen dotted in figs. 4 and 6. A small dovetailed opening, *w*, is left between *u* and *v*, in the face, into which the metal under pressure is forced, and thus causes the force, D, to take hold of the stamped piece and to carry it up. In order to keep the loose piece *v*, close to *u*, a binding screw, *x*, is fitted to a bar, *y*; fixed in the bed, B, the upper end of which bar fits into and slides in a suitable recess in the lower part of the cylinder, E. When the "force," or nose-piece, D, is depressed the inclined surface, *z*, comes in contact with the point of screw, *x*, and forces the piece, *v*, against *u*, as seen at fig. 4, and again when rising the incline, *z*, relieves *v*, which starts back (as seen at fig. 6) and so releases the stamped piece. This is discharged by the force of a helical

spring, 1, placed in a circular cavity in the "force," and presses on a dovetail piece, 2, for that purpose. At this juncture and during the rising of the cylinder, E, the cam, T, takes effect on the shovel apparatus causing the shovel, *s*, to be thrown into the position shown in dotted lines, fig. 3, in time to receive the stamped piece discharged from the "force," as described. A spring, z^1, keeps the cam arm of Y, close up to the cam surface, and draws the shovel, *s*, back and over a funnel opening, s^1. The shovel, *s*, is tilted by a prong, 3, at the next descent of the cylinder, E, and so delivers the stamped piece into a drawer or other suitable reeeptacle below. Thus the several actions of the machine proceed in succession, and at each revolution complete and discharge one impression of the matrix. The stamped pieces or faces thus produced are afterwards trimmed to shapes suitable for the body of the type to which they are to be attached. For this purpose the faces are placed in the bottom of a mould into which molten type metal or other suitable metal is poured. To facilitate the attachment of the metals the back of type faces (that is the stamped pieces) should be turned so that the two parts may become securely soldered together as represented at fig. 7, In order that the type face should assume its exact position in the mould during the pouring of the metal I cause it to fit into a matrix of the same form placed in the bottom of the mould. To assimilate the bottom of this mould to the form and depth of the letter or device I find it advantageous to produce matrices or mould bottoms by means of the electrotype process. For this purpose I take a stamped surface produced by the matrix, C, and apparatus before described, I reduce the back part of the stamped surface until the thickness of the whole is equal to the height for the raised surface of the type, the back of this letter or other device is then trimmed and reduced in the edges to the exact form of the type which is then soldered on a plate of metal. This is now placed in the cell of the galvanic battery such as usually employed for depositing metals, as a mould for the deposit of metal to form the matrix required. I continue the action of the battery till such time as I get a sufficient substance of metallic deposit to form a cast of the stamped impression. The concave thus produced will possess the exact impression of the type face in relief from which it is taken. This matrix, which

may be of copper, I cut to the form of the casting mould of which it is to form the bottom. The type faces are placed in this matrix forming the mould bottom, and being from the same original matrix they will be an exact fit and will retain the type faces in proper position during the process of casting the body as described. Instead of pouring melted metal on the faces to form the bodies of the type they may be attached in other ways, such as soldering in a solid state or by dovetailing or other means, according to the purposes for which they are designed and the size and character of the type; such type faces may also be attached to bodies of wood or other material adapted for the purpose.

Having described the nature of the invention communicated to me and the manner in which it is performed, I would have it understood that I do not confine myself to the precise method of carrying it out herein set forth.

But that what I claim under the before in part recited letters patent is,

First, the formation of grooves or indentations in the wire or blanks from which types are made by compression as hereinbefore described.

Secondly, the formation or manufacture of type faces, such as letters, vignettes, and other devices in relief for printing, by compression in suitable matrices, which faces are attached to bodies and otherwise finished as described. —In witness, &c.

HENRY GARDINER GUION JUDE.

Enrolled March 23, 1853.

Specification of the Patent granted to GEORGE HENRY BROCKBANK, *of Crawley-street, Oakley-square, in the County of Middlesex, Pianoforte Manufacturer, for Improvements in Upright Pianofortes.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—Heretofore it has been usual to get strength to the framing by thick upright bars of wood, and in some cases it has

been attempted to employ metal bars in front of the sounding-board, similar to grand pianofortes. This invention consists of applying an additional wrest-plank in front of the ordinary one, together with metal bars, and causing the wrest-pins to pass through and rest within the additional wrest-plank, (which it is preferred should be of metal,) and fixing in the ordinary wrest-plank as formerly. And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, is a front view of the wrest-plank through which the wrest-pins pass; and

Fig. 2, is a transverse section of the two wrest-planks. *a*, is the ordinary wrest-plank into which the wrest-pins are placed; *b*, is the additional wrest-plank through which the wrest-pins pass and within which they rest, as is shown; *c*, *c*, are metal bars to receive and resist the pressure of the additional wrest-plank, *b*.

I would remark that I have not thought it necessary to show a complete upright pianoforte, as a workman will from the description above given, aided by the drawing, readily understand the invention.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the precise details or forms of the parts, as they may be varied without departing from my invention.

But what I claim is,

The application of an additional wrest-plank in front of the ordinary wrest-plank, together with metal bars, and causing the wrest-pins to pass through and rest within the additional wrest-plank, so that the strings pass between the two wrest-planks.—In witness, &c.

GEORGE HENRY BROCKBANK.

Filed April 1, 1853.

Specification of the Patent granted to THOMAS CHRISTY, *junior, of Gracechurch-street, in the City of London, for Improvements in Weaving Hat-Plush and other Piled Fabrics.*—Sealed October 1, 1852.—(Communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention has for its object improvements in that class of looms where two piled fabrics are woven at the same time, and are cut apart as woven, and consists of combining of a frame fixed in the front of the reed, having two adjustable bars which control the distance at which the two fabrics are from each other, and consequently the length of the pile in each fabric, such frame also having two other bars in front which are adjustable, between which bars the carriage or plate of the knife moves. The knife has a curved-cutting edge and is fixed in a carriage which slides on a bar or rod, and is drawn from side to side by a cord acted on by a wheel moved in alternate directions. The knife in its movement to and fro comes against stones and is sharpened and oiled. The use of jacquard apparatus is unnecessary, the harness being worked from below by treadles and levers. Such looms may be worked by hand or by power. And in order that the invention may be most fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed, which represent sufficient of the parts of a loom and the apparatus applied thereto as to enable me to describe the nature of the said invention.

Description of the Drawings.

Fig. 1, is a front view partly in section; and

Fig. 2, a side view also in section of portions of a loom, having the invention applied thereto, and is drawn to the scale of one inch and one-half to the foot.

Fig. 3, is a plan; and

Fig. 4, an end view of the knife carriage with the hones mounted on their spring carriages.

Fig. 5, a plan; and

Fig. 6, an edge view of the knife or cutter.

Fig. 7, a perspective diagram of the improvements as in use.

Fig. 8, is a plan.

Fig. 9, a front view; and

Fig. 10, a transverse section of the guide frame.

Figs. 3, 4, 5, 6, 8, 9, and 10, are drawn to the scale of six inches as one foot. In each of these figures the same letters are used to indicate the same parts. A, is the carriage of the knife which is moved to and fro by means of the cords, *a*, *a*, which are fixed to and are put in motion by the wheel, E, and the cords are guided correctly by the pulleys, *n*, *n*, as shown. The knife, A^1, is formed with a semicircular-cutting edge and is fixed in its carriage or plate, A, by means of the plate, *d*, and the carriage is caused to slide to and fro on the bar, A^2. In front of the reed and to the framing of the loom is fixed the apparatus, shown separately in perspective at fig. 5. The two ends, T, T, of this apparatus are capable of adjustment by means of the screw-stems, c, and screw unto. The two parts, T, are so formed as to have applied thereto two pairs of bars, *u*, *u*, and *p*, *p*, the objects of which are hereafter described, there being slots at *o*, *o*, in order that one of each of the pairs of bars, *u*, *u*, and *p*, *p*, may be moved and fixed nearer to or further from the other, and in order to fix such upper moveable bars, *u*, *p*, there are screw-pins fixed thereto which pass through the slots, *o*, *o*, and they are fixed by screw-nuts which are not shown in the drawings. It will readily be seen that the distance apart of the bars, *u*, *u*, will determine the length of the pile between the two fabrics simultaneously woven. I do not consider it necessary to enter into any description of the weaving two fabrics simultaneously, and which are for a time joined together by the pile warps, as the same is well understood and forms no part of the present invention, which is confined to improvements in looms used in such manufactures. The workman will adjust the distance apart of the bars, *u*, *u*, according as he desires to produce a longer or shorter pile. The two fabrics pass next between bars, *p*, *p*, in front of which is fixed a stretcher-bar, *i*, by which the two fabrics are opened or separated from each other. The bar or rod, A^2, along which the knife carriage moves is in front of the bars, *p*, *p*, and the bar or rod, A^2, is between the two fabrics in the space which is opened between them by the stretcher, *i*, the fabrics being cut apart when they come between the parallel bars, *p*, *p*, between which the cutting knife moves. The knife and the carriage are prevented vibrating or

moving untruly by reason of the carriage, A, being caused to move between the bars, *p*, *p*, and by reason of its being guided correctly by them. By these means much greater certainty of action of the knife and evenness of pile are obtained than heretofore, and that the knife may be constantly sharpened, two small stones, *r*, *r*, are fixed at one end of the apparatus, by which means the cutting edge is sharpened every alternate movement by the knife coming in contact with the hones, which are slightly pressed towards the knife by slight springs.

The loom to which these improvements are shown to be applied is one which is worked by hand, but a workman will from the above description, aided by the drawings, readily apply like parts to a power loom, similarly constructed to weave two fabrics at the same time.

Having thus described the nature of the said invention, and the manner of applying the same to what I believe to be the most improved arrangement of loom for such purpose, I would have it understood that I make no claim to such loom, which I may here remark is constructed according to an invention for which letters patent have lately been granted to Samuel Holt.

What I claim is,

The combination herein described of the apparatus for regulating the length of pile of the two fabrics made in a loom, and for sharpening the knife above shown and explained.—In witness, &c.

THOMAS CHRISTY.

Filed April 1, 1853.

Specification of the Patent granted to JOSHUA SMITH, *of Sheffield, in the County of York, Merchant, Carrying on Business along with his Partner in Trade, William Thorne, under the firm of Thomas Turner and Company, Merchants and Manufacturers, for Improvements in Table-Knives.*—Sealed October 5, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention consists of fixing sockets on to the blades and fixing the ends of the handles in such sockets by

screws or rivets, such sockets being used with or without tangs. And in order that my said invention and the manner in which the same is to be performed may be most fully understood, I will proceed to describe the drawings hereunto annexed.

Description of the Drawing,

which represents a table-knife constructed according to my invention, there being no tang used, but a tang as well as a socket may be employed, in which case the socket would be applied to a blade made with a tang. *a*, is the blade; *b*, is the socket, which I usually fix by brazing, but it may be otherwise fixed to the blade; *c*, is a rivet, or it may be a screw, which should be beaten down and riveted at its ends, and the holes through the socket should be slightly bell-mouthed, in order that the rivet heads may be within such bell-mouths, and be made flush with the socket at the outer surfaces, as is shown by the drawing.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that the form of the socket which receives the handle and is affixed to the end of the blade of a table-knife, may be varied without departing from my invention.

But what I claim is,

The manufacture of table-knives with sockets fixed thereto to receive and have fixed therein the handles, as described.—In witness, &c.

JOSHUA SMITH.

Filed April 5, 1853.

Specification of the Patent granted to JAMES WEBSTER, *of Leicester, in the County of Leicester, Engineer, for Improvements in the Construction of Springs.* — Sealed October 14, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— My invention consists of constructing springs by bending bars or plates of steel to and fro, so as to form angles or

bends in opposite directions, leaving a space between each bend of a width depending on the play the parts of the spring shall have before they come together and no longer admit further compression. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me. I prefer to employ flat bars or plates of steel with parallel sides and edges, but other sections of steel bars or plates may be used.

Description of the Drawing.

Fig. 1, shows a side view; and

Fig. 2, an end view of a spring constructed according to my invention, which is suitable to be used for the supporting of a carriage-body or other purposes, and the same will be made of a strength and size according to the weight or pressure to which it is to be subjected, as is well understood in the making of other forms of springs, and each spring will consist of more or less bends, and have more or less space left between the bends, according as it is desired to give more or less action to a spring; a spring having been made by bending a bar or plate of steel into the form desired it is to be tempered, as is well understood.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that although the section of steel bar or plate may be varied, and although the angle of the bands may be varied,

What I claim is,

The constructing of springs by bending bars or plates of steel to and fro, so as to form angles or bends in opposite directions, leaving a space between each bend of a width depending on the play the parts of a spring shall have before they come together, and no longer admit further compression, as herein explained.—In witness, &c.

JAMES WEBSTER.

Filed April 14, 1853.

Specification of the Patent granted to Edmund Morewood *and* George Rogers, *of Enfield, in the County of Middlesex, for Improvements in Coating Metals.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—One part of our invention consists in coating zinc with lead by pressure and heat. And in carrying out this part of our invention we prefer to proceed in the following manner. We take a thin sheet of lead and place it upon a plate of sheet zinc, and after heating them to the proper temperature for rolling zinc, pass them between rollers under such a degree of pressure that the zinc shall be a little extended in the operation. If the union between the two metals is not then complete the operation should be repeated, and if the surfaces of the metal in contact be clean the union or adhesion of the two metals will become complete.

Another part of our invention consists in immersing sheets or other articles to be coated (which have been previously cleaned by acid) in hot sand in which there has been mixed a little sal-ammoniac thereby to a certain extent preventing the oxidation of the iron in exposing it to hot air in the customary manner.

Another part of our invention consists in the employment of three rollers within the bath of molten metal when coating sheets of iron or other metal.

Fig. 1, shows a section of the bath and the arrangement of rollers for coating with molten metal according to our improvements. The side rollers, *a*, *b*, so move with the middle roller, *c*, as to cause the sheet of metal, *d*, (to be coated) to descend between the rollers, *a*, *c*, and on the workman bringing the end of the sheet of metal, *d*, which entered the bath last into contact with the roller, *b*, on the other side of the roller, *c*, by means of a hooked iron rod, *e*, or other suitable contrivance, the hooked end of which being placed under the lower edge of the sheet of metal, *d*, as it descends from between the rollers, *a*, *c*, enables him to tilt its upper edge in the direction to enter between the rollers, *b*, *c*, between which it is raised out of the bath. Thus the revolution of the rollers, *c*, *b*, carry up the coated

sheet to be withdrawn from the molten metal on the opposite side of the bath to which it entered. The rollers move in the direction as shown by the arrows. A guide bar, *b**, being placed near the opening between the middle and back, motion is communicated to the middle roller, *c*, by the cog-wheel, *f*, taking into a toothed wheel, c^1, on rollers, the axis of the roller, *c*, which takes into and drives the toothed wheels, a^1, b^1, on the axis of the rollers, *a*, *b*, and the rollers *a*, *b*, *c*, are supported in bearings as shown. The rollers, *a*, *b*, are capable of adjustment by the wedges and screws, a^2, b^2, to govern their distance from the middle roller so that sheets of metal of varying thickness may be passed between them to be coated, the bearings in which the axes of the rollers work should be large enough to allow the axes to revolve freely when submerged in the molten metal, which is marked H, in the drawings, and it is well to keep the rollers in motion until the metal sets on leaving off work.

Although we describe three rollers, two only may be used if they work in such a direction as to carry the sheet downwards when the metal is to be introduced, and if the revolution is reversed when the sheet is to be raised up again, or the two rollers may be used alone for withdrawing the sheets from the molten metal or carrying them down into it. We use a bar, *g*, as shown at fig. 2, to divide the upper part of the bath, so placed as to separate the flux or surface at which the sheets enter the molten metal from that at which they are withdrawn.—In witness, &c.

EDMUND MOREWOOD.
GEORGE ROGERS.

Filed October 1, 1853.

Specification of the Patent granted to JOSEPH HILL, *of Birmingham, in the County of Warwick, Stamper, for A Machine for Stamping Metals and Forging Iron and Steel.*—Sealed October 6, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists of giving motion to a ram or hammer by means of a piston working by atmospheric pressure in a

cylinder, within which cylinder a vacuum is obtained to raise the piston, and with it the ram or hammer, and through which the ram or hammer is raised, and consequently through which it falls on admitting air to the cylinders, is regulated by suitable valves and gearing. And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing,

which represents a section of the machine. *a*, is the cylinder which is fixed in a suitable frame as shown, *b*, is the ram which at its upper end is provided with packing to keep it air tight and yet allow it to slide freely within the cylinder, *a*; at the lower end of the ram there are projections, b^1, b^1, which have grooves formed in them by which these projections slide on the guides, *j*, *j*, of the side framing. The hammer or tool, *c*, suitable for stamping metals or for forging iron or steel is to be fixed on the lower end of the ram, *b*, in like manner to that pursued in steam hammers and which is well understood; *d*, is the pipe leading to a vacuum apparatus which may be kept free from air by means of air pumps or by condensing steam therein as is well understood; *e*, is a valve which is shown in a position to obtain a vacuum in the cylinder, *a*, but on the ram, *b*, rising the valve will be moved and the atmosphere admitted when the ram will immediately descend by its gravity. And in order to regulate the length of stroke to suit any particular work the valve, *e*, is caused to be acted on by the rising of the ram, *b*, in the following manner; *f*, is a rod having a weight, or it may be a spring, *g*, at its end, tending at all times to remain down and to keep the valve, *e*, open to the atmosphere. The rod, *f*, is connected by means of a bell-crank and connecting rod, *k*, to the valve, and the rod, *f*, is kept parallel by the arms, *l*, and *i*, which are attached by pin joints to the rod, *f*, and to the framing. On the pin joint or axis of the arm, *i*, there is fixed an arm, i^1, which rests on the lever or trigger, i^2, which moves on an axis fixed to the framing, all which is clearly shown in the drawing; *h*, is a tappet fixed on the rod, h^1, which moves up and down with the ram; hence when the tappet comes against the tail of the lever or trigger, i^2, the weight, *g*, will be released and the valve will be moved and will open a way for the atmosphere to enter

the cylinder, when the ram, *b*, will descend and in its descent it will at the completion of the stroke by coming against the tail end of the lever, *n*, again move the valve to open the cylinder to the vacuum. It will, therefore, be evident that according to the position of the tappet, *h*, which may be fixed to any part of the rod, h^1, so will be the length of the stroke before the ram is set free.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that I do not confine myself to the details herein described so long as the peculiar character of my invention is retained.

But what I claim is,

The mode of combining the parts herein described in such manner that the ram or hammer may be worked as herein described.—In witness, &c.

JOSEPH HILL.

Filed April 6, 1853.

Specification of the Patent granted to JONAS LAVATER, *of* 19, *Rue Grénelle, St. Honoré, in the City of Paris, in France, for Improvements in Apparatus for Measuring the Inclination of Plane Surfaces, with Angles formed or to be formed thereon.*—Sealed October 2, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists of an arrangement of apparatus wherein a pendulous hand or pointer (which moves freely on its axis) is arranged by preference in a rectangular box or frame having a dial plate on one surface, graduated on either side of a perpendicular or zero up to ninety degrees, so that when the lower part of the frame or box is placed on a surface it will indicate the extent of inclination, and when either of the ends is placed against any surface the instrument will indicate the extent that the surface is from being vertical. And to make such instrument more extensively useful, I sometimes combine therewith a compass, a water-level, a sun-dial, and a graduated scale or measure.

And in order that my said invention, and the manner of

performing the same, may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a front view; and

Fig. 2, a section of the combined apparatus, which is of a rectangular form, so that the top, the bottom, and the side, each offers a straight edge to be placed against a surface; and by so doing, the pendulous pointer will indicate the extent to which such surfaces is out of a true horizontal or vertical position. *a*, is a pendulous pointer moving freely at *b;* hence, when the lower side is placed on a surface truly horizontal, the pointing end at a^1 will indicate or point to *o* on the dial or front, which, it will be seen, is graduated up to ninety degrees on either side of zero; and if the instrument, by one of its ends, be placed against a surface which is truly vertical, the pendulous pointer will point to or indicate zero. And it will readily be understood that when the surfaces to be tested by the instrument are out of truth, whether horizontally or vertically, the pendulous pointer will indicate the extent the surface is out of the true position. By this simple combination of parts, a very useful and cheap instrument is constructed; but to make it still more useful, at the same time at an increased cost, I can apply a measure of inches or otherwise at the lower edge of the front of the instrument, and I can form in the front a sun-dial at the upper part of the front of the instrument, and I can also apply a small compass needle and dial in the middle part of the front of the instrument, and, if desired, a water or spirit level may be fixed flush on either side or surface of the instrument. I, however, generally simply combine the parts constituting the instrument for measuring the angles of surfaces, as first explained, and the other parts are only added in combination therewith when it is desired to give the instrument the greater extent of utility before mentioned.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I do not claim any of the parts separately, nor do I confine myself to the precise details shown and described, so long as the peculiar character of the invention be retained.

But what I claim is, the combining of apparatus into an instrument, as herein described.—In witness, &c.

JONAS LAVATER.

Filed April 2, 1853.

Specification of the Patent granted to STEPHEN PERRY, *of Red Lion-square, in the County of Middlesex, for Improvements in Inkstands or Inkholders.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists,

First, of constructing a flexible, or partly flexible, inkstand or inkholder, with a tube passing from above towards the bottom, so that, by a slight compression, the ink will flow up the tube into a proper cup or dipping place.

Secondly, the invention is applicable to pumping inkstands, and consists of arranging the pump apparatus within a stopper, to fit fluid-tight, in an opening, in place of using screws and other fastenings as heretofore. And in order that my said invention may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a plan and section of a flexible inkstand, which I prefer to be made of gutta percha; other material or materials may be used provided that the vessel or some part of the vessel is sufficiently flexible to act in like manner to the one shown in the drawing, and the form of the vessel may be varied. I would remark, that I do not claim the making of an ink vessel flexible, as that is not in itself new, and flexible elastic pistons have before been used in the moveable pumping apparatus of inkholders; I do not, therefore, claim the same. *a*, is the ink vessel, which is of gutta percha, and it is placed in a wood or other stand, *b*, which may be of any desired device; *c*, is a tube and dipping cup, there being a screw formed at the lower end of the tube, as shown; at the bottom of the vessel, *a*, is formed or fixed a hollow screw, *d*, with passages for the ink to flow through

at the bottom; by screwing down the tube, *c*, the bottom and top of the vessel, *a*, will be drawn towards each other, and the interior capacity will be lessened, and the ink will flow into the cup; and when that quantity has been used, if the cup and tube, *c*, be screwed back, the vessel will again expand, and a quantity of air will pass down the tube, *c*, and rise up into the upper part of the vessel, *a*, which will thus be again filled by air and ink. The consequence will be that when the tube, *c*, is again screwed down, the ink will again rise; and such will be the case, so long as there is a quantity of ink in the vessel, *a*, and a very slight contraction succeeded by expansion of the vessel, *a*, or part of it, will be sufficient to cause the action to be as above described.

Fig., 2, shows a plan and section of another arrangement, differing from that above described in some particulars, but in principle of action the arrangement and construction are the same. *a*, is a vessel, which I prefer to be of gutta percha, though other material or materials may be used in its construction, so long as the bottom or other part is sufficiently flexible; *b*, is the stand of wood or other material; *c*, is the tube and dipping cup. In this arrangement the bottom is acted on by a lever, *e*, which is pressed on by a screw, *f*; hence, by depressing the shorter end of the lever, the other end of it will raise the bottom of the vessel, *a*, and ink will rise to the dipping cup; and when the same is used by the reverse action of the screw, allowing the bottom of the vessel, *a*, to descend, a quantity of air will pass down the tube, and ascend to the upper part of the vessel, *a*, which will render the inkstand again in a position to have a further quantity of ink raised to the cup; and by repeating these movements of the parts, the ink will be raised, so long as there is a quantity of ink in the vessel, *a*.

I will now describe the second part of my invention, the object of which is to arrange a suitable pumping apparatus in a stopper, by which it may the more readily be removed for repair or otherwise, and another substituted.

Fig. 3, is a section and plan of an arrangement for this purpose. I would, however, remark that the shapes of the parts may be varied. *a*, is an ordinary ink vessel; *c*, the dipping cup and tube; *d*, is the opening for receiving the stopper, *e*, which is to fit air-tight. At the upper part of the stopper, *e*, is formed the pumping apparatus, which is preferred, and which is of an ordinary construction; it con-

sists of a disc of vulcanized india-rubber, *f*, fixed at its edges, as is shown and well understood, and deflected by a screw or otherwise. This pumping apparatus may be varied, so long as it is arranged in a stopper, in place of being fixed as heretofore.

Having thus described the nature of my invention, I would have it understood that what I claim is,

First, the combining a flexible or partly flexible ink vessel, with a dipping cup and tube passing from above towards the bottom; and

Secondly, I claim the combining of pumping apparatus with a stopper of ink vessels.—In witness, &c.

STEPHEN PERRY.

Filed April 1, 1853.

Specification of the Patent granted to HENRY M'FARLANE, 8, *Lawrence-lane, in the City of London, for Improvements in Stoves or Fire-places.*—Sealed October 11, 1852.—(Communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention consists of combining parts so as to obtain a more advantageous stove or fire-place for heating-rooms and other rooms, and consists of combining an exterior and interior chamber, the fire being in the interior chamber, surrounded by sand or other absorbent, acting in like manner in the space between the interior and exterior casings; at the lower part of such apparatus is a compartment for receiving water, which can rise up through a perforated plate, and come in contact with the lower part of the sand. Above the fire and sand compartments is formed radiating apparatus, which may be varied in form according to taste; but such apparatus consists of hollow spaces communicating with the sand compartment, whereby, when in use, the heat of the fire will cause the surrounding sand to be heated, which being moistened with water from below, such water will be vaporized and pass into the radiating apparatus above, and as the same condenses it will fall to the lower part of the radiating apparatus, and return to the sand to be again vaporized. Thus will the apparatus offer a large extent of heating surface to the surrounding air.

And in order that the invention may be more fully understood, and readily carried into effect, I will proceed to describe the drawing hereunto annexed, in the various figures of which the same letters are used to indicate the same parts.

Description of the Drawing.

Fig. 1, is a plan of a stove or fire-place constructed according to the invention.

Fig. 2, shows an elevation thereof.

Fig. 3, is a vertical section.

Fig. 4, shows a horizontal section of the upper part of the stove; and

Fig. 5, shows a horizontal section taken below the fire. A, is the fire; B, are the fire-bars or grates; C, is the fire-door; E, F, G, is the flue by which the products of combustion, passing from the fire, first ascend, then descend, and then pass into a chimney. The fire is surrounded by a chamber, H, filled with sand or other absorbent, below which there is a compartment, K, containing water; the partition, *d*, which sustains the sand or other matter being perforated, so that the water may rise just above the perforated bottom or horizontal partition, *d*, and a supply of water is from time to time filled in at *e*. The upper part of the stove is composed of numerous radial narrow chambers or compartments, *f*, *f*, open to the centre, closed at top and bottom, except at *g*, where the vapour rises from the sand and flows into the numerous radial compartments, *f*, *f*. Any water which may condense will return from the chambers, *f*, *f*, back into the sand by the opening at *g*, as will readily be understood on examining the drawing. By this arrangement a combination of parts when the fire is lighted will heat the surrounding sand, and consequently evaporate the water, the vapour of which will ascend and flow into the upper chambers or compartments, *f*, of the stove, and thus will a very extensive surface be heated with a moderate heat. I would remark that, although the upper compartments, *f*, are generally used simply as recipients of the vapour from the water, in some cases they also may be filled with sand or matters similarly absorbent of water. And in place of these narrow compartments being arranged radially, they may be differently arranged, and their shape or form may be varied, as well as the form of the lower part of the stove.

Having thus described the nature of the invention, I

would have it understood that what I claim is, the mode herein described of combining parts into a stove or fire-place.—In witness, &c.

HENRY M'FARLANE.

Filed April 11, 1853.

Specification of the Patent granted to JOHN OLIVER YORK, *of Paris, Engineer, for Improvements in Connecting and in Fixing Rails in Railway Chairs.*—Sealed October 16, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— The invention consists of substituting a cast or wrought-iron wedge-piece pin and key for the wooden wedge usually employed for fixing a rail in a chair, such wedge-piece also answering the purpose of "a fish-piece" now employed by some engineers. And in order that my said invention may be more fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

Description of the Drawing.

Fig. 1, shows a section of a rail fixed in a chair, according to my said invention.

Fig. 2, is a plan of the chair; and

Fig. 3, shows another section of a rail, according to my invention, the parts being somewhat different in form, but acting on the same principle. *a*, is the chair of the form I prefer, but its shape may be varied. It is made with only one jaw, *b*, the other side of the rail being held by a wedge-piece, *c*, which acts between the point bearing against the rail at c^1, and its point of bearing, c^2, as a lever moving on the point, c^2, as an axis, as shown, and it is caused to wedge itself tightly between the points, c^1, c^2, by means of the key, *d*, or by the pin and key, *d*, as are shown respectively in figs. 1 and 2, and 3 and 4; when the wedging-piece, *c*, is intended to act as a fishing-piece for two rails in a joint chair, then I prefer to make it at its upper end, c^1, wider than that shown.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it

understood that what I claim is, the mode herein described of combing wedging-pieces, and pins and keys with chairs for connecting and fixing rails of railways.—In witness, &c.

JOHN OLIVER YORK.

Filed April 16, 1853.

Specification of the Patent granted to JOHN LEE STEVENS, *of Kennington, in the County of Surrey, for Improvements in Furnaces.*—Sealed October 1, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention relates to double furnaces where the product from the fuel on one set of fire-bars passes over or through the bright fire on the other set of fire-bars, which has heretofore been proposed to be accomplished in various ways. And the improvements consist of applying the second fire-bars above the first in such manner that the bridge at the back end is common to the two sets of bars, and the fuel may be fed on to the two sets of bars through the one fire door.

The object of which invention is the more complete combustion of the products of the fuel as well as to prevent or lessen the formation of smoke, which has heretofore been proposed to be accomplished in various ways, and in order that my invention may be most fully understood I will proceed to describe the same with reference to the accompanying drawings.

Fig. 1, is a longitudinal; and,

Fig. 2, a transverse section of a furnace arranged or combined according to my invention applied to a steam-boiler, A, air passage; B, doorway to second or upper furnace and from which second furnace ignited fuel descends on to the first set of fire-bars; C, first set of fire-bars nearest the floor; D, second or upper set of fire-bars, of one, two, or more ranges according to the length of the furnace; E, aperture by which fuel passes over the second set of fire-bars; F, plate between which and the bridge and the products of the fuel on the first set of fire-bars pass up and mix with the products from and over the other set

of fire-bars. In large furnaces or those used for marine or purposes wherein the fire is kept up continuously for many hours, I protect the front of the plate with fire-bricks carried by a bar about four inches above the ends of the fire-bars; D, G, course of the current of air; H, bridge serving for both sets of fire-bars; *a*, *b*, line of transverse section.

It will be seen by this description that whilst the first set of fire-bars, C, is supplied with fuel over and through the second set of fire-bars, D, the current of air, G, accumulating heat and velocity in a rapidly increasing ratio, in consequence of its passing between two strata of fire, as well as between the plate, F, and the bridge, H, which are naturally heated by the action of both fires, carries up with it the products of the fire at C, and mixes the products of the fire from D, therewith, whereby the most attainable combustion is effected and the formation of smoke most materially lessened if not entirely prevented.

I am aware that previous arrangements have been made of sets of fire-bars placed over each other, and that various other means have been proposed for increasing the combustion of fuel and for consuming or lessening the formation of smoke, I do not therefore claim such arrangements or means otherwise than herein mentioned.

What I do claim is,

The mode herein described of combining and arranging fire-bars and the manner of supplying the first set with fuel thereby causing the products of the fuel of the two furnaces to be mixed and better consumed, as above explained.—In witness, &c.

JOHN LEE STEVENS.

Filed April 1, 1853.

Specification of the Patent granted to WILLIAM BATES, *of Leicester, in the County of Leicester, Fuller and Dresser, for Improvements in Apparatus for getting up Stockings, and other Hosiery goods.*—Sealed October 29, 1853.

To all to whom these presents shall come, &c., &c.—My invention consists of making the shapes hollow, with numerous perforations, so that air heated or otherwise may be forced through the stockings, or other articles of hosiery.

placed on the shapes. And in order that my invention may be most fully understood, and readily carried into effect, I will proceed to describe the means pursued by me. I employ hollow metal shapes of the forms of the parts of the body which the articles of hosiery goods are to cover, and such shapes are to be made with numerous perforations or passages, so that a shape shall be suitable for keeping a stocking or other article of hosiery in shape, and at the same time leave as free passage as may be for air to pass through the shape, and through the articles of hosiery fabric thereon. The articles of hosiery in a damp state are placed on shapes such as above described, and they are then to be subjected to streams of air, heated or otherwise, forced into the interior of the shapes. I generally use heated air for the purpose, and I find it convenient to obtain heated air for the purpose by forcing air, by a fan or suitable blowing apparatus, through pipes passing through and fixed in a steam-boiler, the heated air passing into a suitable box or chamber having on the upper surface openings to receive pipes fixed at the lower ends of the shapes used, or such shapes may be otherwise connected with the box or chamber, and other means of obtaining heated air may be employed.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that what I claim is, the applying shapes and apparatus suitable for receiving thereon articles of hosiery goods, and causing the same to be subjected to streams of air heated or not, as herein described.—In witness, &c.

WILLIAM BATES.

Filed April 29, 1853.

Specification of the Patent granted to MOSES POOLE, *of Serle-street, in the County of Middlesex, Gentleman, for Improvements in Moulding Articles when India-rubber combined with other Materials are employed.*—Sealed October 1, 1852.—(Communication.)

To all to whom these presents shall come, &c., &c.—This invention is a communication from America, in behalf of Mr. Goodyear, the inventor, and consists of using sheets of india-rubber combined with sulphur, with or without other materials; and with such sheets the moulds are lined,

and the mould then filled with sand or other fine or pulverized matter (which will bear the necessary heat), by which the sheets are caused to be pressed with every part of the mould, and the same are then to be subjected to a high degree of heat till a hard substance is produced. And in order that the invention may be more fully understood, and readily carried into effect, I will proceed to describe the means practised in America, and as communicated to me.

The moulds employed it is preferred should be of metal, and generally of sheet metal, though metal in other forms, as well as other materials, may be used, this invention not being for the construction or use of particular moulds, but for a mode of moulding articles when using sheets or thin forms of india-rubber combined with sulphur, with or without other matters, and converting such matters into a hard substance by heat when in the moulds. According to the nature of the article to be moulded, so will be the character of the mould used; thus, supposing it were desired to mould a drinking-cup, or other form of vessel, of the materials above mentioned, in which case a mould of sheet or other metal or materials would be employed, having its internal form of the shape and character intended to be given to the exterior of the article intended to be moulded therein, and the sides or other parts thereof may be ornamented by embossing or otherwise, and the mould is to be of one or more parts, according to the shape of the article. Moulds of several parts are used where the openings into them are less than other parts, and also where the ornamented parts are so undercut as to require the moulds to be taken to pieces, in order, by separating the parts of the moulds (after the moulding has been completed), to get the articles moulded therein out of the moulds. In using such a mould the bottom is generally first covered with a portion of a sheet of the prepared india-rubber, then the upper part of the mould is to be lined with another portion or other portions of a sheet of prepared india-rubber, the parts which are to be joined being first coated with india-rubber cement, having therein sulphur; or in place of lining the mould, by applying the separate pieces in succession within the mould, the separate pieces which are to form an article may be joined or connected together before introducing the same into the mould. Having lined the mould, sand or other fine granular matter, which will bear the heat hereafter mentioned, is to be introduced into and pressed within the

mould, and within the article therein, by which means the prepared india-rubber will be caused to enter all parts of the mould, both the ornamental as well as other parts, and in this state all matters are to be retained till the desired result has been obtained.

I would remark, that india-rubber, both alone and with other materials, has before been combined with sulphur, and such compounds have been subjected to heat, and hard articles, both moulded and otherwise, have been thereby and by the aid of heat obtained, and for which letters patent were taken by a Mr. Newton in 1851, in behalf of Mr. Goodyear, no claim is therefore made under the present letters patent for manufacturing hard materials by such means, but only the mode of moulding articles thereof, as herein explained.

The articles placed in moulds and made of prepared india-rubber, as before mentioned, are next to be subjected to heat in any convenient manner for about six hours; and it is found that the following mode of regulating the heat is desirable, viz., to raise the heat slowly for about half an hour up to 230 degrees of Fahrenheit, and to retain the same at that temperature for about two hours, and then to raise the heat gradually during the remainder of the six hours up to 295 to 305 degrees of Fahrenheit, the lower of these two temperatures appearing to produce the more tough or horny character, and the latter temperature producing more the character of whalebone. In combining india-rubber with sulphur, other materials, such as pigments or colouring matters may be used, as well as sulphur, as has heretofore been done, and to which no claim is made; and in place of using sulphur, matters composed partly of or combined with sulphur may be used, so long as the requisite sulphur may be present with the india-rubber when heat is applied thereto to produce the result above mentioned. And I may state that it is found that about one part by weight of sulphur to two parts by weight of india-rubber produce the best results.

Having thus described the nature of the invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details herein given, so long as the peculiar character of the invention be retained.

But what is claimed is,

The mode herein described of moulding articles made of

India-rubber (either with or without other matters) combined with sulphur.—In witness, &c.

MOSES POOLE.

Filed April 1, 1853.

Specification of the Patent granted to MOSES POOLE, *of Serle-street, in the County of Middlesex, Gentleman, for Improvements in Making Covers for and in Binding Books and Portfolios, and in Making Frames for Pictures and Glasses.*—Sealed October 1, 1852.

To all to whom these presents shall come, &c., &c.—This invention is communicated to me from America on behalf of Mr. Goodyear, the inventor, and consists of employing in such manufactures of a hard substance, produced by subjecting india-rubber combined with sulphur, with or without other matters, to a high temperature. And the invention also consists of employing india-rubber, combined with sulphur in binding or fixing the leaves, and then subjecting the india-rubber to heat to produce a change therein. And in order that the invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by the inventor and as communicated to me.

In making the backs or covers for books and portfolios, I employ sheets of india-rubber, combined with sulphur or matters containing sulphur; for this purpose two-thirds by weight of india-rubber to one-third by weight of sulphur are intimately blended together by means of a masticating machine, with or without colouring matters; and the same being rolled into thin sheets are placed on to thick paper-board or strong woven fabric, the india-rubber being turned over at the edges according to the size and character of the book or portfolio, or the covers and back are made wholly of sheets of the compounded materials by using thicker sheets of the compound, with fibre or woven fabric adhering to the inner surfaces; and having shaped them they may be pressed into a mould to obtain the desired device or character, and the process of heat may be conducted whilst the compound is between the surfaces of

the moulds; or the process of heat may be performed before obtaining the desired pattern, and then producing the device by pressure between dies or engraved surfaces; the hinges are produced by vulcanized india-rubber alone applied to the surfaces of a woven fabric. The heat necessary for obtaining the desired result requires to be applied for about six hours; raising the temperature slowly up to about 230 degrees of Fahrenheit, say in about half an hour, and retaining about that temperature for one and a-half hours, and then raising it again gradually during the remainder of the six hours up to about 295 degrees of Fahrenheit, but where a large quantity of foreign matters are in the compound the heat may be raised more quickly. In cases where the covers are to be affixed by cementing to other matters after the process of heat, such as paper, pasteboard, or cloth, the surfaces of the covers should be coated with woven fabric before subjecting the covers to heat, by which means the covers can have affixed thereto paper or other material which can thereby be made to adhere. In those cases where the ornamenting of the exterior surfaces of covers of the material above described, may be done after applying the heat, then the surfaces are to be acted on when at a temperature of about 300 degrees of Fahrenheit, when the matter or substance will take very sharp impressions.

In carrying out the second part of the invention the leaves of the book are at the back to be coated with india-rubber cement, containing sulphur for producing vulcanization, which I prefer to contain at the rate of one pound of india-rubber, about two ounces of sulphur, half a-pound to a pound of white lead, and half an ounce of the carbonate of potash. Straps of woven fabric may be applied across at intervals, extending across the hinge for the purpose of strengthening the back and hinge of the book, and in order that the edges of the leaves may be well combined with the india-rubber cement, I have found it desirable to rough the edges with a rasp, or sand-paper, or other instrument, and having thus coated the back of the book I apply heat till the change called vulcanization is produced, which will generally result in about fifteen minutes by applying heat of about 265 degrees of Fahrenheit, by a metal or other surface; and this I find it convenient to do by means of a hollow metal-shape to the form of the back of the book,

in which water is caused to circulate in the manner known as Mr. Perkin's plan, in closed pipes.

In making the frames for pictures and glasses I employ sheets of the compounds above described, and either use them as veneers after the sheets are vulcanized to cover the surfaces of wood frames, or else I mould them solid to the design or device desired, as when moulding other articles of such compounds, and as is fully described in the specification of another patent granted to me in behalf of the said Mr. Goodyear, and when very sharp and well-finished devices are desired, the hardened material may be pressed at a temperature of about 300 degrees of Fahrenheit between dies.

Having thus described the nature of the said invention, and the manner of performing the same, I would have it understood that what I claim is, the application of the hard substance of a whalebone or ivory-like texture produced by combining india-rubber and sulphur, and subjecting the same to heat to the making of the covers of books and portfolios, and to the making of frames for pictures and glasses.

And I also claim the connecting of the leaves of books together with india-rubber combined with sulphur, and converting or vulcanizing the same by heat.—In witness, &c.

MOSES POOLE.

Filed April 1, 1853.

Specification of the Patent granted to ROBERT BIRD, *of Crewkerne, in the County of Somerset, for Improvements in the Straining of Webs of Saddles.*—Sealed October 19, 1852.

To all to whom these presents shall come, &c., &c.—Heretofore the straining webs of saddles have been simply composed of flax or hemp, which webs are prepared by the saddle-makers so as to be as little liable to stretch as may be.

Now, this invention consists of manufacturing webs suitable for and applying the same in making saddles, such webs being composed of yarn or thread of flax, hemp, or

other suitable fibre, together with wire. And in order that my said invention may be more fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

A warp of yarns is placed in a loom, in like manner to that heretofore practised when about to weave straining webs for saddles, and in addition thereto I apply a warp of several fine copper wires, so that the wires will alternately appear on the two surfaces of the straining web, and I have usually introduced such wires at a distance apart of about the eighth of an inch, and I cause such warp of wire to be alternately up and down during two picks of weft, but these details may be varied. And in using such straining webs in saddles it will only be necessary to cut off the exact length required, and to affix the same to a saddle-tree, the trouble and inconvenient process of fixing being avoided.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is, the manufacture and application of straining webs of saddles, employing wire in combination with yarns, as herein explained.—In witness, &c.

ROBERT BIRD.

Filed April 19, 1853.

Specification of the Patent granted to GERARD ANDREW ARNEY, *of Mitcham, in the County of Surrey, Gelatine Manufacturer, for Improvements in Coating or Enamelling Pictures, Papers, and other Surfaces.*—Sealed October 13, 1852.

To all to whom these presents shall come, &c., &c.—My invention in coating or enamelling prints, pictures, papers, card, and other surfaces, consists of covering them with gelatine which has been rendered insoluble by combination with alumina. A solution of gelatine, having mixed with it a small portion of ox gall, is poured on a sheet of glass; when set in a jelly it is immersed in a solution of acetate of alumina or other soluble salts of alumina, which being rinsed with water, (in the event of colour being required it is passed through a dye bath of the required

colour,) the jelly on the glass is then to be coated with a weak solution of gelatine; the print, picture, paper, card, or other surface is then to be damped and placed smoothly on the glass with the face towards the jelly. The back of the print, picture, paper, card, or other surface, is to have a coat of a solution of gelatine without the ox gall, and when it has become solid the whole is to be immersed in a solution of a salt of alumina as before, it is then to be taken out and rinsed in water and dried; when thoroughly dry, the picture, print, paper, card, or other surface is incased in an envelope of insoluble gelatine; and in order that my said invention may be more fully understood and readily carried into practice, I will proceed to describe the means pursued by me.

In carrying out my invention I take a warm solution of gelatine of sufficient strength to set into a firm jelly when cold; I mix with it a small proportion of ox gall, usually about one ounce to each gallon of solution of gelatine, I then pour a quantity of this solution of gelatine upon a sheet of clean glass, using only sufficient to give a very thin and even coating over all parts of the glass, and I allow the coating to set into a jelly, I then place the glass, with the coating of gelatine upon it, in a vessel, filled with a solution of acetate of alumina.

The acetate of alumina I prepare by adding eight ounces of alum and eight ounces of acetate of lead to each gallon of water, stirring the mixture occasionally for two hours. A white precipitate takes place, which must be allowed to settle for at least twelve hours, the clear supernatant liquid may then be drawn off.

I usually allow the coated glass to remain for two or three hours in this solution, but the time may be varied to suit the thickness of the coating of gelatine or the degree of hardness desired, I then take the coated glass from the vessel and rince it well for some minutes in water, or the glass may be left for half an hour in water to free the gelatine from any excess of acetate of alumina.

The sheet of gelatine on the glass will now be insoluble in water; and I proceed by giving it another very slight coating with a weaker solution of gelatine than before by pouring some on and running it off again as quickly as possible.

The print, picture, paper, card, or other surface to be enamelled is to be slightly and evenly damped and rubbed smoothly on the second coating of gelatine with the

face of the print, picture, paper, card, or other surface towards the jelly, beginning at one end of the print, picture, paper, card, or other surface, and rubbing it evenly towards the other end in the same manner in which prints are now faced with ordinary gelatine.

In the case of prints, show-cards, or placards which are not intended to be mounted, I proceed to give the back a coating of gelatine of the same thickness as that applied to the face which prevents the tendency to curl or warp, and if desired it may be rendered insoluble by immersion in the solution of acetate of alumina, as before stated.

The print, picture, paper, card, or other surface, is to be dried slowly by placing it in a warm room for two or three days, and when thoroughly dry may be removed from the glass by cutting round the edges with a knife.

Prints, pictures, papers, cards, or other surfaces, may be enamelled by placing them at once upon the first sheet of gelatine applied to the glass and before immersion in the acetate of alumina, but I prefer to use the method before stated, as it involves less risk and is more certain in its action.

In the event of a coloured surface being required upon the print, picture, paper, card, or other surface, the sheet of insoluble gelatine after its removal from the acetate of alumina and after being rinsed in water is to be placed in a dye vat until the required tint be obtained, the colours to be used may be such as are ordinarily used by dyers; cochineal or dye woods for pink, soluble indigo for blue, saffron or dye woods for yellow, and so on.

Another method I adopt to produce a coloured surface is to mix a strong solution of colouring matter with the gelatine employed in giving the second or intermediate coating between the print, picture, paper, card, or other surface and the insoluble facing of gelatine.

Having now described the nature of my invention and the manner of performing the same, I would have it understood that what I claim as my invention is the method of coating of prints, pictures, papers, cards, and other surfaces with gelatine which has been rendered insoluble by a combination with alumina.—In witness, &c.

GERARD ANDREW ARNEY.

Filed April 13, 1853.

Specification of the Patent granted to JOHN COLLIS BROWNE, *Assistant Surgeon to the Forces at Fort Pitt, Chatham, in the County of Kent, for the Relief of Individuals suffering from Pulmonary Affections or Diseases of the Chest.*— Sealed October 28, 1852.

To all to whom these presents shall come, &c., &c.— This invention consists of constructing of a waistcoat or such like garment, lined or cased with flannel or other fibrous fabric, to be worn next the person, such garment being double and composed of air-tight fabric or material so that it may be inflated, but as the simply making it double would have the effect of its being one large inflated bag, it is divided internally into numerous compartments or cells communicating with each other, whereby when inflated the thickness through any part of the garment will be comparatively small. It is also provided with a valve for the purpose of inflation or otherwise as may be required. It possesses the property at the same time of a life-preserver on occasions of sudden immersions in the water, and in order that my said invention may be more fully understood and readily carried into effect I will proceed to describe the means pursued by me. I employ for the purpose of my invention, cotton, silk, linen, or other fabric rendered waterproof, as is well understood, and I have the same cut into the shape and size suitable for covering the chest of the person, and this portion of the garment is made double and the edges are closed and cemented as is well understood in making up articles of water and air-proof fabrics, and the interior, when requisite, is also to be closed and cemented together at intervals, and by preference both vertically and horizontally, with a view to divide the interior into many small compartments or cells which communicate with each other, and I introduce a tube with a valve for inflating this garment such as is now used in air-tight articles. The garment when inflated will in appearance be similar to a quilted or fluted garment, when cemented as described, and it is to be formed with arm-holes and an opening for the neck, somewhat after the fashion of a vest, but having a division at the side, or back, or other part, in order to facilitate the putting on of the garment, and the same may be attached by buttons, strings, straps,

or elastic bands, or otherwise, for the purpose of fixing it to the person, and in making up this garment I prefer that it should be lined with flannel or other woollen fabric to come next the person, but this is not essential.

Having thus described the nature of my invention and the manner in which the same is to be performed, I would remark that it will be evident that the pulmonary organs, when such a garment is worn, will not be subject to sudden chills by reason of the nonconducting property of the air contained in the double garment, and I would state that the apparatus or garment may be made to vary in form.

What I claim is the application of double water and air-tight fabrics such as herein described in the manufacture of garments suitably formed for covering the chest, for the purpose of retaining air as a medium for equalizing the temperature surrounding or appertaining to the body.—In witness, &c.

JOHN COLLIS BROWNE.

Filed April 28, 1853.

Specification of the Patent granted to JOHN THOMAS WAY, *of Holles-street, Cavendish-square, in the County of Middlesex, Professor of Chemistry, and* JOHN MAINWARING PAINE, *of Farnham, in the County of Surrey, Gentleman, for Improvements in the Manufacture of Burned and Fired Ware.*—Sealed November 17, 1852.

To all to whom these presents shall come, &c., &c.—These improvements consist of applying a stone or clay (found in Surrey, and which will probably be found in other parts), which is composed largely of soluble silica in these manufactures, and also of combining clay, lime, and other materials, with reference to the quantity of soluble silica present (whether naturally or artificially obtained), which we have found to be capable of varying the character of burned and fired ware produced, and in order that our said invention may be more fully understood we will proceed to describe the means pursued by us. We employ the earth silica in the condition known to chemists as soluble silica, or gelatinous silica, and the natural earths, beds, or strata,

containing silica in the same soluble state, to mix with ordinary or prepared clays with or without lime, or other alkaline earths and bases, in various proportions, according to the particular object in view, for the production when burnt of bricks, artificial stone, pottery, porcelain, and such like articles, but before we proceed further to describe our invention we will for the better understanding thereof describe what we mean by "soluble" or "gelatinous" silica. By this term we intend to specify that peculiar form or condition of silica or silex, which is found to be readily soluble in solutions of caustic, potash, or soda, when boiled with these solutions in open vessels. This kind of silica is when artificially prepared, obtained by adding to solutions of silicate of potash or soda, a mineral or other acid, by which the silica is precipitated in the "gelatinous" state.

This soluble or gelatinous silica differs from the silica of sand flint or quartz rock, inasmuch as these last-named substances are not practically soluble in solutions of potash or soda when boiled with these solutions in open vessels, and can only be so dissolved by them when enclosed in vessels fitted with steam-tight covers, by which pressure and a much higher temperature is obtained.

Having explained what we mean by soluble or gelatinous silica, we now proceed to state that we have discovered that certain beds or strata of earth at the base of the chalk hills, occurring in parts of Surrey and elsewhere, contain large proportions of silica in this soluble condition. Such minerals are easily recognised by reducing them to fine powder; boiling the powder in caustic soda, and afterwards adding to the solution formed, an excess of hydrochloric acid, which precipitates the silica. The silica thus obtained should amount to at least ten per cent. of the weight of the original mineral. And one part of our invention consists in using the earth of these beds, either separately or in admixture with each other, or with clay, in such proportions and with or without lime, or other alkali or alkaline earth, as may be required for the production of different kinds of burnt wares.

We will here observe, that we produce the different kinds of burnt wares by a proper adjustment of the quantity of soluble silica, in relation to the composition of the clay with which it is mixed, and by a greater or less temperature and length of time in the burning. And in order that these

matters may be fully understood, we will describe our method of producing several kinds of materials for building purposes.

To produce a superior kind of plain or ornamental brick, or tile or slabs suitable for the lining of walls, we proceed as follows:—

Having ascertained, by chemical examination, the proportion of soluble silica contained in different samples of the earth in question, we reduce such earths to powder by mechanical means, as is well understood. We find fifteen to thirty per cent. of soluble silica to be the most suitable for the purposes mentioned, when using the earth alone, or we mix the requisite quantity of the earth, containing a higher per centage than those given above of soluble silica, with ordinary clay, in such relative quantities that the mixture shall contain the proportion of soluble silica above stated.

Having prepared the materials by either of the above methods, we proceed to mould the bricks or other articles either by pressure or in the ordinary way. When pressure is employed, we find it desirable to use the materials in a slightly damp state, but not so much so as is usual in the making of bricks from clay. In fact, we prefer to use the materials as dry as may be, having reference to the mode of moulding resorted to. The bricks or other articles being moulded, are to be dried in the air, or in drying chambers, and are then to be burned in the usual way in suitable kilns; the degree of heat, however, and the length of time occupied in the burning, materially affect the character of the article produced. For instance, a gentle burning produces a material comparatively soft and capable of being sawn, cut, or planed, like stone or wood; it is, therefore, sometimes desirable to stop the burning at this point, and to give to the articles, by the use of tools, a higher degree of finish and sharpness than is possible by the method of moulding before described; and the goods, when so worked up, may be a second time heated and carried by an increased temperature and duration of the firing to a much greater degree of hardness and strength. And with a sufficiently elevated temperature, the material may be made of extreme hardness, so as to be capable of taking a high polish like granite. In this latter form we propose to employ it in the manufacture of mantel-pieces, table tops, and other articles requiring such degree of hardness.

We have stated that for the manufacture of moulded articles we employ a mixture in which the proportion of soluble silica varies from fifteen to thirty per cent.; when it is intended that the material produced should be employed as stone, and be cut or tooled, it is desirable to employ a larger proportion of soluble silica, which is found to render the product more granular and open in texture. The same is the case when bricks are intended for the building of furnaces, kilns, and in other cases where they will be exposed to a high temperature, and we find that in making fire-bricks the proportion of soluble silica may, with advantage, be as high as from thirty-five to forty-five per cent.; but it is to be observed that when present, in above a certain proportion, the silica destroys the ductility of the mixture, which cannot then be moulded by hand as ordinary clay, but must be subjected to pressure. We have hitherto spoken only of the mixtures of the different earths containing soluble silica with each other or with ordinary clay. But we find that a different and for many purposes very valuable kind of material is obtained by mixing with these ingredients a certain proportion of lime or other alkali or alkaline earth. Thus to produce a yellowish white or lemon-coloured stone, in imitation of the best building stones, we employ a mixture of earths, as before described, in which the soluble silica is in the proportion of from thirty-five to forty-five per cent., with eight or ten per cent. of lime. The mixture may be moulded by hand or pressed into moulds, as before described, (the latter being the preferable method,) and afterwards dried and burned. We employ lime in the state, either of burnt lime slaked or unslaked, or in the state of carbonate of lime or chalk. We have found that the mixture when made with slaked lime gives the best results, but in some cases chalk may be advantageously employed, as being the most economical.

We have found that by varying the proportions of soluble silica and of lime, in relation to the clay, we are enabled to produce different kinds of stone, more or less resembling natural stone, fitted for building and other purposes, and this stone is capable of being cut with tools after being fired. We have also found that the addition of a small proportion of lime to a mixture containing a high per centage of soluble silica produces a good fire-brick.

We claim as of our invention the use of natural earths, mineral beds, or strata, which contain soluble silica in con-

siderable quantities, and the admixture of these earths for of soluble silica itself) in different proportions with clay, and with or without the addition of lime or other alkalies for the production, when burned of bricks, tiles, pipes, fire-bricks, and of artificial stone suitable for building, having ornamental purposes, and for the filtration of water, and applicable to various other useful purposes.

We also claim the use of "soluble silica," or of earths containing it, in the manufacture of different kinds of porcelain, as a substitute for the powdered flint or other insoluble silica, at present employed in these manufactures. We do not, however, claim any novelty in the mechanical means employed for mixing the materials, or in the modes of moulding, shaping, or burning the same. Neither do we claim the use of sand, powdered flint, or other form of silica other than that form described by us as "soluble silica."—In witness, &c.

JOHN THOMAS WAY.
JOHN MAINWARING PAINE.

Filed May 17, 1853.

Specification of the Patent granted to WILLIAM H. SMITH, *of the County of Montgomery, and State of Pennsylvania, America, Clergyman, for Improvements in the Manufacture of Lava Ware.*—Sealed October 12, 1852.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My said invention consists in a manufactory of scoria or slag from reducing furnaces into a ware, which I denominate "lava ware." For said manufactory I employ hot fluid, slag or scoria, using it directly out of the smelting blast or reverberatory furnace, by running it into suitable moulds, or into a car, or into the chamber of a reverberatory furnace, constructed with a special reference to the refining and working of vitreous products.

In the process of moulding, casting, pressing, and blowing, I use great caution lest the ware be chilled or suffer sectional electro-polarization before it is placed in the annealing oven and thoroughly annealed.

An essential part of my invention consists in the applica-

tion of the reverberatory furnace in which I refine colour and soften slag for the above mentioned purpose; I find it necessary to use a compound reverberatory furnace, consisting of many consecutive chambers, constructed upon the following plan, reference being had to the annexed drawings, in which

Fig. 1, represents a vertical section; and

Fig. 2, a ground plan. In fig. 1, letter R, represents a boiler for generating steam to be used to propel machinery for grinding ware or other purposes, but especially to supply a continuous current of steam to the fuel, by which the reverberatory is heated to add intensity to the flame.

Letter V, represent a many-chambered hearth, consisting of eight or more chambers, separated from each other by suitable bridges. I represent hoppers placed over one or more of said chambers. E, represents the chimney, with the damper, *f*; H, represents an opening or outlet for heat from the base of the chimney into adjacent annealing ovens, which I construct as a part of the furnace. The letter, C, represents openings or holes on the sides of each chamber out of which the vitreous material is dipped or blown; W, represents an arched chamber under the furnace hearth to be used as an annealing room.

Figs. 1, 2, 3, 4, 5, 6, 7, and 8, represent the series of chambers into which the entire hearth is divided, and *n*, indicates a door in each chamber to be used in emptying it or filling it with materials.

In fig. 2, of the ground plan, P^1, represents a basin or mould into which melted metal, reduced in chamber, 6, from the ore (by the flame issuing from the fire-place, T,) is removed or moulded; S, represents a mould into which slag or scoria is run after it has been removed from above the surface of the metal in chamber, 6, to the chamber, 7, which is used as a reservoir for the slag melted in chamber, 6; N, represents the annealing ovens.

The dimensions of the above compound reverberatory, which may be varied in different localities, I ordinarily determine as follows:—The hearth, V, I construct thirty-six feet long, and divide into eight compartments, each four feet long. The height of the hearth, which is three feet in the centre, diminishes to one and a half feet towards the sides, which (viz., the sides) are made shallow to ensure throughout fusion of the vitreous products at the place from which it is gathered for working.

The width of the hearth at the point where it is separated from the fire-place by a bridge is seven feet. At the chamber, 6, the hearth tapers to five or six feet width, and at the chimney or termination of the hearth it is ten or eleven feet wide. The form of the hearth thus becomes shad-shaped. The draught throughout the entire hearth is determined by a chimney, E, fifty feet high, the upper part of which is furnished with a damper opened by means of a chain and lever, by which the amount of air admitted into and of heat escaping from the furnace can be regulated. This damper is closed when the heat is to be passed through the annealing ovens, through the opening, H. The bridge separating the fire-place from the hearth is raised to within three or four inches of the top of the arch of the hearth. The bridges between the consecutive chambers allow of twelve inches space for the flame to reverberate from one end of the hearth to the other. The bridge adjacent to the chimney is about the same height as that next to the fire-place. The flame and heat are admitted within the chimney by openings made in the base of the side of the chimney adjacent to and terminating the furnace. The boiler is built in the fire-brick arch covering the hearth, either directly over the flame or at any convenient height above the upper surface of the flame of the hearth.

In my manufacturing process I use this reverberatory furnace, either for forming pure slag by the reduction of metallic ores without the admixture of coal or other fuel (the flame being supplied from the fire place) for the separation of the slag from the ores thus fused and the subsequent colouring, refining, softening, and working of slag. Or, if I am supplied with good slag by an ordinary blast or reverberatory furnace, I use the several chambers of the above described furnace for refining colouring and working the slag thus obtained.

The ware which I manufacture consists of all the varieties of pressed, blown, and cast-glass ware, including, bottles, slabs, pitchers, vases, bells, voltaic troughs, stoves, columns, cylinders, tiles, table tops, mantelpieces, coffins, monuments, statuary, building blocks, and electrically-insulated furniture and apparatus.

What I claim as my invention, and desire to secure by letters patent, consists in.

First, the manufacture of a new vitreous ware, to be called lava ware, made from hot and fluid scoria obtained

from blast and reverberatory reducing furnaces for smelting of various ores by the processes of refining, moulding, blowing, casting and annealing.

Secondly, I claim in said manufactory, the process of refining and working vitreous products in a compound reverberatory such as above described, which may be used either for preparing suitable slag directly from the ore by fusing without the admixture of fuel with the ore, or for refining and working vitreous products obtained from the ordinary furnaces, or for manipulating on any vitreous products whatever.

Thirdly, I claim in said manufactory the use of precautionary means to protect the molten material from sectional polarization, either by heat or electricity previous to the completion of the annealing process.—In witness, &c.

WILLIAM H. SMITH.

Filed April 12, 1853.

PATENTS SEALED TO MAY 17, 1853.

1083. ARCHIBALD SLATE, of Woodside Iron Works, near Dudley in the county of Worcester, Civil Engineer, for Improvements in the production of motive power from elastic fluids.—Dated December 16, 1852. Sealed April 20, 1853.

1084. ARCHIBALD SLATE, of Woodside Iron Works, near Dudley, in the county of Worcester, Civil Engineer, for Improvements in propelling vessels.—Dated December 16, 1852. Sealed April 20, 1853.

1085. JAMES DUNLOP, of Haddington, in the county of Haddington, Scotland, Saddler, for Improvements in saddles.—Dated December 16, 1852. Sealed April 20, 1853.

1090. ARCHIBALD SLATE, of Woodside Iron Works, near Dudley, in the county of Worcester, Civil Engineer, for Certain improvements in the arrangements for working the slide-valve for the induction and eduction of fluids.—Dated December 17, 1852. Sealed April 20, 1853.

1091. ARCHIBALD SLATE, of Woodside Iron Works, near Dudley, in the county of Worcester, Civil Engineer, for steam-boilers.—Dated December 17, 1852. Sealed April 20, 1853.

1046. WILLIAM HENRY FOX TALBOT, of Lacock Abbey, in the county of Wilts, for Improvements in obtaining motive power.—Dated December 13, 1852. Sealed April 20, 1853.

161. LOUIS JULES JOSEPH MALEGUE, Dyer, of Paris, for A certain colouring composition for dyeing tissues or stuffs of silk and cotton.—Dated January 22, 1853. Sealed April 20, 1853.

243. DAVID STEPHENS BROWN, of No. 2, Alexandrian Lodge, Old Kent-road, in the county of Surrey, Gentleman, for Improvements in

barometers, part of which invention is applicable to the registry of other fluctuations than those of barometers. — Dated January 31, 1853. Sealed April 20, 1853.

379. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in apparatus to be employed for veneering surfaces. — Dated February 11, 1853. Sealed April 20, 1853.—(A communication.)

415. MATTHIAS WALKER, of Horsham, in the county of Sussex, Ironmonger, for Improvements in vessels or apparatus for containing and preserving ale, beer, and other liquors. — Dated February 17, 1853. Sealed April 20, 1853.

429. NATHAN DUTTON, of No. 31, Great George-street, Liverpool, Cabinet Maker, for Improvements in the manufacture and application of dowels, and machinery connected therewith, parts of which machinery are applicable to other purposes. — Dated February 18, 1853. Sealed April 20, 1853.

488. JULIANA MARTIN, of Soho-square, London, for An improved apparatus for artificial hatching.—Dated October 22, 1852. Sealed April 22, 1853.

505. WILLIAM MACBAY, of Woolwich, in the county of Kent, for Improvements in extinguishing fire in dwellings, factories, and other buildings, and in ships.—Dated October 23, 1852. Sealed April 22, 1853.

581. JULIAN BERNARD, of Guilford-street, Russell-square, in the county of Middlesex, Gentleman, for Improvements in the manufacture of glass.—Dated October 30, 1852. Sealed April 23, 1853.

583. RICHARD ARCHIBALD BROOMAN, of Fleet-street, in the city of London, for Improvements in revolving fire-arms.—Dated October 30, 1852. Sealed April 23, 1853.—(A communication.)

638. HENRY SPENCER, of Rochdale, in the county of Lancaster, Manager, and EDMUND TAYLOR, of the same place, Engineer, for Improvements in steam-engines and boilers.—Dated November 3, 1852. Sealed April 23, 1853.

756. FRANCIS MONTGOMERY JENNINGS, of Cork, Manufacturing Chemist, for Improvements in preparing flax, hemp, china-grass, and other vegetable fibrous substances.—Dated November 15, 1852. Sealed April 23, 1853.

996. JOHN SYMONDS, of Glass House-yard, East Smithfield, in the county of Middlesex, Galvanized Iron Merchant, and GEORGE MOUCHET, of Battersea, in the county of Surrey, Gentleman, for An improved mode of cleaning or scaling metallic surfaces.—Dated December 8, 1852. Sealed April 23, 1853.

1015. JOHN SHERINGHAM, of No. 24, Edwardes'-square, Kensington, in the county of Middlesex, for Improvements in the construction of stove-grates.—Dated December 10, 1852. Sealed April 23, 1853.

1048. JAMES BELL, of Portobello, North Britain, for Improvements in railway chairs.—Dated December 14, 1852. Sealed April 23, 1853.

307. JOHN PERKINS, of Manchester, Mechanical Daughtsman, for Improvements in the treatment of certain bituminous mineral substances, and in obtaining products therefrom. — Dated February 4, 1853. Sealed April 23, 1853.

320. JOHN WHITEHOUSE, the elder, and JOHN WHITEHOUSE, the

younger, of Birmingham, Brass Founders, for Certain improvements in the manufacture of knobs for doors and other like uses, part of which improvements is applicable to the manufacture of certain articles of earthenware.—Dated February 5, 1853. Sealed April 23, 1853.

388. JOHN BETHELL, of No. 8, Parliament-street, Westminster, Gentleman, for Improvements in obtaining copper and zinc from their ores.—Dated February 15, 1853. Sealed April 23, 1853.

522. EDWARD DUKE MOORE, of Ranton Abbey, near Eccleshall, in the county of Stafford, Merchant, for An improved mode of treating the extract of malt and hops.—Dated March 2, 1853. Sealed April 23, 1853.

536. SAMUEL COLT, of Spring-gardens, in the county of Middlesex, Gentleman, for An improved construction of blower.—Dated March 3, 1853. Sealed April 23, 1853.—(A communication.)

538. SAMUEL COLT, of Spring-gardens, in the county of Middlesex, Gentleman, for Improvements in rotating breech fire-arms.—Dated March 3, 1853. Sealed April 23, 1853.—(Partly a communication.)

520. CLAUDE MAMES AUGUSTIN MARION, of Paris, for A new kind of damper for moistening stamps and paper.—Dated October 26, 1852. Sealed April 26, 1853.

524. CHARLES ROWLEY, of Birmingham, Button Manufacturer, for Certain improvements in nails.—Dated October 26, 1852. Sealed April 26, 1853.

590. WILLIAM PETRIE, of Woolwich, in the county of Kent, Civil Engineer, for Improvements in the manufacture of sulphuric acid.—Dated November 1, 1852. Sealed April 27, 1853.

878. THOMAS CHARLES MEDWIN, of the firm of Medwin and Hall, of Blackfriars-road, in the county of Surrey, Engineers, for Improvements in water-guages or instruments for indicating the height of water in boilers.—Dated November 26, 1852. Sealed April 27, 1853.

1075. CHARLES BARLOW, of Chancery-lane, London, for Improvements in bleaching, purifying, and concentrating sulphuric acid, parts of which invention are applicable to evaporating other liquids. —Dated December 16, 1852. Sealed April 27, 1853.

47. CHARLES WILLIAM LANCASTER, of New Bond-street, in the county of Middlesex, Gun Manufacturer, for An appendage to bullet moulds.—Dated January 7, 1853. Sealed April 27, 1853.

135. CELESTIAN MALO, of the firm of Malo and Company, of Dunkerque, France, Ship Builders, for Improvements in steam-generators.—Dated January 19, 1853. Sealed April 27, 1853.

138. PETER ROTHWELL JACKSON, of Salford, in the county of Lancaster, Engineer, for Improvements in the manufacture of hoops and tyres for railway wheels and other purposes.—Dated January 20, 1853. Sealed April 27, 1853.

142. RICHARD MOUNTFORD DEELEY, of Audman-bank, in the county of Stafford, Glass Manufacturer, for Improvements in the grates of furnaces used in the manufacture of glass.—Dated January 20, 1853. Sealed April 27, 1853.

218. THOMAS SYMES PRIDEAUX, of Garden-road, St. John's-wood, in the county of Middlesex, Gentleman, for Improvements in the manufacture of iron.—Dated January 28, 1853. Sealed April 27, 1853.

357. WILLIAM BALL, of Ilkeston, in the county of Derby, Lace and Glove Manufacturer, for Improvements in machinery for producing looped fabrics.—Dated February 10, 1853. Sealed April 27, 1853.

453. JOHN RICHARD COCHRANE, of Glasgow, Manufacturer, for Improvements in the manufacture or production of ornamental or figured fabrics.—Dated February 22, 1853. Sealed April 27, 1853.

458. REUBEN PLANT, of Brierley-hill, Staffordshire, for Improvements in safety-lamps.—Dated February 23, 1853. Sealed April 27, 1853.

459. ROBERT MILLIGAN, of Harden Mills, Bingley, in the county of York, for Improvements in apparatus for washing slivers of wool.—Dated February 23, 1853. Sealed April 27, 1853.

469. THOMAS DE LA RUE, of Bunhill-row, in the county of Middlesex, Manufacturer, for Improvements in producing ornamental surfaces to paper and other substances.—Dated February 24, 1853. Sealed April 27, 1853.

477. WILLIAM SYMINGTON, of No. 41, Gracechurch-street, for Improvements in preserving milk and other fluids.—Dated February 25, 1853. Sealed April 27, 1853.

493. CHARLES TETLEY, of Bradford, in the county of York, Gentleman, for Improvements in obtaining power by steam and air.—Dated February 26, 1853. Sealed April 27, 1853.

494. CHARLES TETLEY, of Bradford, in the county of York, Gentleman, for Improvements in the manufacture of bobbins. — Dated February 26, 1853. Sealed April 27, 1853.

501. EDWARD HAMMOND BENTALL, of Heybridge, in the county of Essex, Ironfounder, for Improvements in harrows.—Dated February 28, 1853. Sealed April 27, 1853.

505. SAMUEL CUNLIFFE LISTER, of Manningham, near Bradford, in the county of York, for Heating and making cards.—Dated February 28, 1853. Sealed April 27, 1853.

507. THORNTON LITTLEWOOD and CHARLES LITTLEWOOD, of Rochdale, in the county of Lancaster, Woollen Manufacturers, for Improvements in machinery or apparatus used in the preparation of wool, silk, flax, and mohair to be spun.—Dated March 1, 1853. Sealed April 27, 1853.

512. WILLIAM ROWETT, of Liverpool, for Improvements in making paddle-wheels for vessels propelled by motive power, which is called "the cylinder paddle-wheel."—Dated March 1, 1853. Sealed April 27, 1853.

515. ROBERT LEWIN BOLTON, of Liverpool, in the county of Lancaster, Merchant, for A new mode of obtaining and using power by explosion of gases.—Dated March 1, 1853. Sealed April 27, 1853.

517. CHARLES HENRY HALL, of Liverpool, in the county of Lancaster, Cook, for An improved apparatus for cooking by gas or vapour.—Dated March 2, 1853. Sealed April 27, 1853.

523. LEWIS JENNINGS, of Fludyer-street, Westminster, Mechanical Engineer, for An improved apparatus for regulating the speed of machinery.—Dated March 2, 1853. Sealed April 27, 1853.

535. SAMUEL COLT, of Spring-gardens, in the county of Middlesex, Gentleman, for Improvements in rotating breach fire-arms.—Dated March 3, 1853. Sealed April 27, 1853.—(Partly a communication.)

537. SAMUEL COLT, of Spring-gardens, in the county of Middlesex,

Gentleman, for Improved machinery for forging metals.—Dated March 3, 1853. Sealed April 27, 1853.—(Partly a communication.)

546. George Elliott, of St. Helen's, Lancashire, Manufacturing Chemist, for Certain improvements in manures.—Dated March 3, 1853. Sealed April 27, 1853.

552. James Boydell, of the Anchor Iron Works, Smethwick, for Improvements in the construction of bedsteads.—Dated March 4, 1853. Sealed April 27, 1853.

585. John Wright, of Camberwell, in the county of Surrey, Engineer, for Improvements in the construction of bedstead and other frames.—Dated March 8, 1853. Sealed April 27, 1853.

586. Alexander Samuelson, of Hull, in the county of York, for Improvements in the manufacture of bricks and tiles.—Dated March 8, 1853. Sealed April 27, 1853.

587. Frederick William Emerson, of the Trereiffe Chemical Works, Penzance, for Improvements in obtaining tin from ores.—Dated March 8, 1853. Sealed April 27, 1853.

552. George Hattersley, of Sheffield, in the county of York, for A radiating hearth plate.—Dated October 28, 1853. Sealed April 28, 1853.

577. John Crowther, of Huddersfield, Contractor, and William Teale, of Wakefield, Engineer, for Improvements in obtaining motive power.—Dated October 30, 1852. Sealed April 30, 1853.

578. Edmund Adolphus Kirby, of Haverstock-hill, Surgeon, for An improved adjusting couch for medical, surgical, and general purposes.—Dated October 30, 1852. Sealed April 30, 1853.

598. Henry Brock Billows, of the Curtain-road, London, for Improvements in the construction of gas-burners for illuminating and heating purposes.—Dated November 1, 1852. Sealed April 30, 1853.

608. Jerome Andre Drieu, of Manchester, Machinist, for Improvements in machinery for weaving and for dividing double cloth to make pile fabrics.—Dated November 2, 1852. Sealed April 30, 1853.

609. John Nicholas Marion, Gentleman, of Paris, for A new mode of rendering concrete coleseed oil.—Dated November 2, 1852. Sealed April 30, 1853.

628. Alfred Sidebottom, of Downham-road, Islington, in the county of Middlesex, Civil Engineer, for Improvement in machinery or apparatus for cutting books, paper, and other substances.—Dated November 3, 1852. Sealed April 30, 1853.

754. William Fraser Rae, of Edinburgh, Brass Founder, for Improvements in gas-heating and cooking apparatus.—Dated November 15, 1852. Sealed April 30, 1853.

814. Robert Heggie, of Kirkcaldy, in the county of Fife, Manufacturer, for Improvements in railway breaks.—Dated November 22, 1852. Sealed April 30, 1853.

830. James Armitage, of Bury, in the county of Huntingdon, Machine Maker, and Charles Thaxter, of Fenton, in the same county, Brick Maker, for Improvements in dies for moulding plastic materials.—Dated November 23, 1852. Sealed April 30, 1853.

1106. John Clay, of Cottingham, in the East Riding of the county of York, Esquire, for Improvements in the manufacture of coal gas. Dated December 18, 1852. Sealed April 30, 1853.

1113. Charles Pilkington, Thomas Pilkington, and Abraham

PEDIGOR, of Sheffield, Joiners' Tool Makers, for An improved joiners' brace. Dated December 20, 1852. Sealed April 30, 1853.

48. GEORGE STEWART, of Enniskillen, Ireland, Gentleman, for Improvements in railways and in the propulsion of engines, carriages, and other vehicles thereon. Dated January 7, 1853. Sealed April 30, 1853.

436. PIERRE AUGUSTE TOURNIERE, of No. 14, Kennington-terrace, Upper Kennington-lane, in the county of Surrey, Gentleman, for Improvements in propelling.—Dated February 19, 1853. Sealed April 30, 1853.

438. SAMUEL RODGERS SAMUELS and ROBERT SANDS, both of Nottingham, Lace Manufacturers, for Improvements in looms for weaving.—Dated February 21, 1853. Sealed April 30, 1853.

451. PIERRE FREDERICK GOUGY, of Castle-street, Gentleman, and DAVID COMBE, of King-street, both in the county of Middlesex, Gentleman, for Improvements in apparatus for skidding or stopping wheels of carriages and other vehicles.—Dated February 22, 1853. Sealed April 30, 1853.

628. THOMAS HUNT, of Leman-street, Goodman's-fields, in the county of Middlesex, for Improvements in the construction of sights for fire-arms.—Dated March 12, 1853. Sealed April 30, 1853.

637. WILLIAM POPE, of Holford-square, Pentonville, in the county of Middlesex, Engraver, for Improvements in the ventilation of ships.—Dated November 4, 1852. Sealed May 4, 1853.

639. JOSEPH REYNAUD, of Paris, for Certain improved means of imitating marbles and various coloured woods.—Dated November 4, 1852. Sealed May 4, 1853.

641. COLLINSON HALL, of Essex, Farmer, for An apparatus to be used in the carriage of solid and liquid bodies.—Dated November 5, 1852. Sealed May 4, 1853.

651. HESKETH HUGHES, and WILLIAM THOMAS DENHAM, both of Cottage-place, City-road, in the county of Middlesex, Manufacturers of Fancy Trimmings, for Certain machinery for the manufacture of fancy ribbons, ornamental trimmings, chenilles, fringes, and gimps.—Dated November 5, 1852. Sealed May 4, 1853.

652. JAMES HADDEN YOUNG, of No. 66, College-street, Camden Town, in the county of Middlesex, for Improvements in weaving.—Dated November 5, 1852. Sealed May 4, 1853.

709. GEORGE LUCAS, of No. 42, Kennedy-street, Manchester, Engraver, for A composition for filling engraved cast or sunk letters, devices, or ornaments, on or in brass, zinc, or other metallic plates.—Dated November 11, 1852. Sealed May 4, 1853.

725. JULIEN FRANCOIS BELLEVILLE, Manufacturer, of Paris, for Improvements in generating steam for producing motive power or heat.—Dated November 12, 1852. Sealed May 4, 1853.

744. GRAY DENISON EDMESTON, of Salford, in the county of Lancaster, Engineer and Millwright, and THOMAS EDMESTON, of Crow Oaks, Pilkington, in the same county, Calenderman, for Certain improvements in steam engines, which improvements are also applicable to the regulating of water-wheels or similar machinery.—Dated November 15, 1852. Sealed May 4, 1853.

765. JOSEPH JOHNSON, of Wellington Quay, Dublin, for An improved mode of producing ornamental articles, such as brooches, bracelets, dressing and other cases, work and other boxes, or other like

articles from a certain kind of wood—Dated November 16, 1852. Sealed May 4, 1853.

795. HENRY BESSEMER, of Baxter House, Old-street, St. Pancras-road, in the county of Middlesex, for Improvements in apparatus for concentrating cane-juices and other saccharine solutions, and in the treatment of such fluids.—Dated November 19, 1852. Sealed May 4, 1853.

796. HENRY BESSEMER, of Baxter House, Old-street, St. Pancras-road, in the county of Middlesex, for Improvements in the crystallization and manufacture of sugar.—Dated November 19, 1852. Sealed May 4, 1853.

797. HENRY BESSEMER, of Baxter House, Old-street, St. Pancras-road, in the county of Middlesex, for Improvements in the treatment of washed or cleansed sugar.—Dated November 19, 1852. Sealed May 4, 1853.

799. HENRY BESSEMER, of Baxter House, Old-street, St. Pancras-road, in the county of Middlesex, for Improvements in apparatus for concentrating saccharine fluids.—Dated November 19, 1852. Sealed May 4, 1853.

1105. CHARLES CONSTANT BOUTIGNY, of Evreux, France, Chemist, for Improvements in distillation, and in the apparatus employed therein.—Dated December 18, 1852. Sealed May 4, 1853.

39. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in the construction of bearings or steps for shafts, turn-tables, or moveable platforms, which invention I denominate "Parry's improvements."—Dated January 6, 1853. Sealed May 4, 1853.—(A communication.)

341. HENRY POOLEY, of Liverpool, Ironfounder, for Improvements in weighing machines.—Dated February 10, 1853. Sealed May 4, 1853.—(A communication.)

359. ROBERT ASH, of No. 211, High-street, Southwark, in the county of Surrey, for Improvements in stopping bottles and other vessels.—Dated February 10, 1853. Sealed May 4, 1853.

363. WILLIAM POTTS, of Birmingham, Manufacturer, for Improvements in sepulchral and other commemorative monuments.—Dated February 10, 1853. Sealed May 4, 1853.

437. WRIGHT JONES, of Pendleton, in the county of Lancaster, Engineer, for Improvements applicable to steam-pipes, used for warming, drying, or ventilating.—Dated February 21, 1853. Sealed May 4, 1853.

483. FREDERICK GOODELL, of Half Moon-street, Piccadilly, in the county of Middlesex, Gentleman, for An improved apparatus for the distillation of rosin oil, and for an improved method of bleaching and deodorizing the same during the process of manufacture.—Dated February 25, 1852. Sealed May 4, 1853.—(Partly a communication.)

491. The Honourable JAMES SINCLAIR, commonly called Lord Berriedale, of No. 17, Hill-street, in the county of Middlesex, for Improvements in weaving.—Dated February 26, 1853. Sealed May 4, 1853.

525. ROBERT WADDELL, of Liverpool, Engineer, for Improvements in steam-engines.—Dated March 2, 1853. Sealed May 4, 1853.

555. JOHN GEDGE, of No. 4, Wellington-street, Strand, in the

county of Middlesex, for Improvements in the construction of fire-arms, and in the means of loading the same.—Dated March 5, 1853. Sealed May 4, 1853.—(A communication.)

562. Richard Barter, of Saint Ann's-hill, Blarney county, Cork, M.D., for Improvements in cutting roots and other vegetable substances.—Dated March 7, 1853. Sealed May 4, 1853.

592. James Kimberley, of Birmingham, Manufacturer, for A new or improved gas stove.—Dated March 9, 1853. Sealed May 4, 1853.

593. James Hogg, junior, of Nicholson-street, Edinburgh, Publisher, for Certain improvements in machinery or apparatus for cutting paper and other substances.—Dated March 9, 1853. Sealed May 4, 1853.

597. Joseph Shuttleworth, of the Stamp End Iron Works, Lincoln, Agricultural Engineer, for Improvements in appendages to portable machines for thrashing, shaking, and winnowing corn.—Dated March 9, 1853. Sealed May 4, 1853.

601. George Collier, of Halifax, in the county of York, Mechanic, for Improvements in the manufacture of carpets and other fabrics.—Dated March 9, 1853. Sealed May 4, 1853.

605. George Collier, of Halifax, in the county of York, Engineer, and Samuel Thornton, of the same place, Machinist, for Improvements in spinning, roving, doubling, and twisting cotton, worsted, flax, and other fibrous material.—Dated March 9, 1853. Sealed May 4, 1853.

607. James Walmsley, of Scout, Newchurch, near Manchester, Woollen Printer, for Improved machinery and arrangements for block printing.—Dated March 10, 1853. Sealed May 4, 1853.

611. George Collier, of Halifax, in the county of York, Engineer, for Improvements in machinery or apparatus used in weaving.—Dated March 10, 1853. Sealed May 4, 1853.

619. Moses Poole, of Avenue-road, Regent's Park, in the county of Middlesex, for Improvements in apparatus for serving oysters and other shell fish.—Dated March 11, 1853. Sealed May 4, 1853.—(A communication.)

627. George Michiels, of Holywell-street, Westminster, for Improvements in obtaining oxygen for manufacturing purposes.—Dated March 12, 1853. Sealed May 4, 1853.

658. John Ryall Corry and James Barrett Corry, of Queen Camel, in the county of Somerset, Leather Dressers and Glovers, for A new method of sewing gloves.—Dated November 6, 1852. Sealed May 6, 1853.

668. Charles Frederick Day, of Ashford, Kent, and John Laylee, of Rye, Sussex, for Certain improvements in sleepers, and other permanent ways of railroads.—Dated November 6, 1852. Sealed May 6, 1853.

670. Charles Tropeau, of Paris, for An improved diurnal reflector.—Dated November 8, 1852. Sealed May 7, 1853.

688. George Stradforth Ogilvie, of Stapleton, near Bristol, Gentleman, for Improvements in candlesticks and lamps.—Dated November 9, 1852. Sealed May 7, 1853.

693. William Tudor Mabley, of Manchester, for Improvements in ornamenting glass and other transparent, or partially transparent, substances for windows, and for other purposes.—Dated November 9, 1852. Sealed May 7, 1853.

890. MATHURIN JEAN PRUDENT MORICEAU, of Paris, for Improvements in sharpening and dressing the cards of carding machines, and the clippers and cylinders of shearing machines.—Dated November 26, 1852. Sealed May 7, 1853.

917. JOHN BRANNIS BIRCH and EUGENIUS BIRCH, both of Cannon-row, Parliament-street, in the county of Middlesex, Civil Engineers, for Improvements in forming drains, and introducing pipes or tubes into the earth.—Dated November 30, 1852.—Sealed May 7, 1853.

1103 EDWARD SCHISCHKAR, of the firm of James Akroyd and Son, of Halifax, in the county of York, Manufacturers, for Improvements in dyeing and colouring yarns and textile fabrics.—Dated December 18, 1852. Sealed May 7, 1853.

1104. EDWARD SCHISCHKAR, of the firm of James Akroyd and Son, of Halifax, in the county of York, Manufacturers, for Improvements in colouring or staining yarns and textile fabrics.—Dated December 18, 1852. Sealed May 7, 1853.

1196. JAMES POWER, Merchant, residing in Paris, for Silvering all sorts of metals and of glass.—Dated December 29, 1852. Sealed May 7, 1853.

59. FRANCIS PARKER, of the firm of William Parker and Sons, of Northampton, Boot and Shoe Manufacturer, and WILLIAM DICKS, of Leicester, Bootmaker, for Improvements in boot, shoes, and that kind of spatterdashes termed "antigropelos."—Dated January 8, 1853. Sealed May 7, 1853.

159. REUBEN PLANT, of Brierly-hill, Staffordshire, for Improvements in the construction of glass-house furnaces.—Dated January 21, 1853. Sealed May 7, 1853.

608. JOHN POWIS, and JABUS STANLEY JAMES, both of Watling-street, in the City of London, Wholesale Ironmongers, for Improvements in machinery for slotting, tenoning, morticing, grooving, drilling, boring, and vertical planing.—Dated March 10, 1853. Sealed May 7, 1853.

620. JOHN GILBY, of Beverley, in the county of York, Esquire, for Improvements in fire-arms.—Dated March 12, 1853. Sealed May 7, 1853.

696. JOHN DOWN GORDON, of Eldon-street, Finsbury, in the county of Middlesex, Pianoforte Manufacturer, for Improvements in tuning pianofortes.—Dated November 9, 1852. Sealed May 9, 1853.

703. AUGUSTE BABONEAU, Manufacturer, of Paris, for An improved apparatus for melting and mixing asphalt with bitumen, and other substances.—Dated November 10, 1852.—Sealed May 10, 1853.

717. WILLIAM DAVIS, of Leeds, Machinist, for Improvements in machinery for cutting files.—Dated November 11, 1852. Sealed May 10, 1853.

718. WILLIAM EDWARD MIDDLETON, of Birmingham, Engineer, for A new or improved circular saw-bench.—Dated November 12, 1852. Sealed May 11, 1853.

723. DANIEL HENWOOD, of Chalton-street, Somer's-town, for Improvements in machinery for registering the number of passengers or persons entering public vehicles or vessels, theatres, bridges, or other places, where it may be desirous to ascertain the number of persons entering therein.—Dated November 12, 1852. Sealed May 11, 1853.

724. CHARLES SEATON, of Fitzroy-street, Fitzroy-square, Esquire, for Improvements in the manufacture of metal tubes, and in the machinery employed therein. — Dated November 12, 1852. Sealed May 11, 1853.

732. ROBERT JOHN SMITH, of Islington, in the county of Middlesex, Gentleman, for Certain improvements in machinery or apparatus for steering ships and other vessels. — Dated November 13, 1852. Sealed May 11, 1853.

801. JOHN TRESTRAIL, of Southampton, for Improvements in raising sunken vessels or other materials from under the water, or in the sea, or to prevent them from sinking.—Dated November 20, 1852. Sealed May 11, 1853.

803. JAMES NASMYTH, of Patricroft, near Manchester, Engineer, for Certain improvements in machinery or apparatus for packing and compressing cotton, wool, and other substances.—Dated November 20, 1852. Sealed May 11, 1853.

809. WILLIAM GREEN, of Islington, in the county of Middlesex, for Improvements in the manufacture of textile fabrics, and in machinery or apparatus for effecting the same, parts of which improvements are also applicable to printing and embossing generally. — Dated November 20, 1852. Sealed May 11, 1853.

847. HENRY THOMSON, of Clitheroe, in the county of Lancaster, Calico Printer, for Improvements in apparatus to be used in dyeing, bleaching, and other processes in which goods are operated upon in the piece.—Dated November 24, 1852. Sealed May 11, 1853.

853. STEPHEN SPALDING, of Hogsthorp, near Alford, in the county of Lincoln, for An apparatus or machine for the manufacture of pantiles, used in building purposes,—Dated November 24, 1852. Sealed May 11, 1853.

860. WILLIAM HALL, of Nottingham, Cabinet Maker, for Improvements in rotary steam-engines, governors, and apparatus for supplying boilers with water, and for regulating the same.—Dated November 25, 1852. Sealed May 11, 1853.

953. RICHARD ARCHIBALD BROOMAN, of No. 166, Fleet-street, in the city of London, for Improvements in the manufacture of sugar.—Dated December 3, 1852. Sealed May 11, 1853.—(A communication.)

461. ASA WILLARD, of St. John, in the province of New Brunswick, British North America, for Improvements in machines for manufacturing butter, to be called " A. Willard's Butter Machine."—Dated February 23, 1853. Sealed May 11, 1853.

570. JOSEPH JOHN WILLIAM WATSON, of Old Kent-road, in the county of Surrey, for Improvements in illuminating apparatus, and in the production of light.—Dated March 7, 1853. Sealed May 11, 1853.

616. FRANCIS PRESTON, of Manchester, Spindle and Flyer Maker, for Improvements in the manufacture of bobbins and spools.—Dated March 11, 1853. Sealed May 11, 1853.

651. CHARLES HEARD WILD, of St. Martin's-lane, in the county of Middlesex, Civil Engineer, for Improvements in fishes and fish-joints for connecting the rails of railways.—Dated March 16, 1853. Sealed May 11, 1853.

667. JOHN HENRY JOHNSON, of No. 47, Lincoln's Inn-fields, in the county of Middlesex, Gentleman, for Improvements in steam-engines.—(A communication.)

727. JOHN HENRY JOHNSON, of 47, Lincoln's Inn-fields, in the county of Middlesex, Gentleman, for Improvements in measuring and registering the flow of fluids.—Dated November 12, 1852. Sealed May 12, 1853.—(A communication.)

735. ROBERT LUCAS, of No. 3, Furnival's Inn, in the city of London, Mechanical Draughtsman, for Improved machinery to be used in the preparation of cotton and other fibrous materials for spinning.—Dated November 13, 1852. Sealed May 12, 1853.

748. CONSTANT JOUFFROY DUMERY, of Paris, Civil Engineer, for Certain improvements in the manufacture of metallic pipes and tubes, and in the machinery employed therein.—Dated November 15, 1852. Sealed May 13, 1853.

750. JOHN MIRAND, of Paris, for Certain improvements in the construction of electric apparatus for transmitting intelligence.—Dated November 15, 1852. Sealed May 13, 1853.

773. HENRY RUSSELL, of Norwich, Pianoforte Maker, for Improvements in pianofortes.—Dated November 17, 1852. Sealed May 13, 1853.

769. FRANCOIS VALLEE, of Bruxelles, Manufacturer, for Improvements in preparing, spinning, and doubling flax, cotton, wool, silk, and other fibrous materials.—Dated November 16, 1852. Sealed May 16, 1853.

781. JAMES HUME, of Birkenhead, in the county of Chester, Plumber, for Improvements in water-closets.—Dated November 19, 1852. Sealed May 17, 1853.

481. PETER ARMAND LE COMTE DE FONTAINEMOREAU, of No. 4, South-street, Finsbury, London, for Improvements in machinery for manufacturing fishing and other nets.—Dated November 24, 1852. Sealed May 17, 1853.—(A communication.)

846. JOSEPH HENRI COMBRES, of Paris, for preventing the ill effects of dampness in walls and dwellings.—Dated November 24, 1852. Sealed May 17, 1853.—(A communication.)

848. CHARLES FINLAYSON, of Manchester, Engineer, for Improvements in apparatus for heating, drying, and ventilating.—Dated November 24, 1852. Sealed May 17, 1853.

855. ROBERT MORTIMER GLOVER, of Newcastle-upon-Tyne, M.D., for Improvements in coating the bottoms and other parts of ships and vessels, in order to prevent animal and vegetable growth.—Dated November 24, 1852. Sealed May 17, 1853.

858. JOHN TATHAM and DAVID CHEETHAM, of Rochdale, in the county of Lancaster, Machine-makers, for Improvements in machinery or apparatus for preparing, spinning, and doubling cotton, and other fibrous substances.—Dated November 25, 1852. Sealed May 17, 1853.

869. ADAM OGDEN, of Huddersfield, in the county of York, Machine-maker, and JOHN OGDEN, of Hey Chapel, Ashton-under-Lyne, Manager of a Cotton-spinning Mill, for Improvements in machinery for spinning cotton or wool.—Dated November 26, 1852. Sealed May 17, 1853.

870. JAMES WARD HOBY, of Renfrew, North Britain, Engineer, and JOHN KINNIBURGH, of Renfrew, aforesaid, Foundry Manager, for

Improvements in the manufacture of metal castings.—Dated November 26, 1852. Sealed May 17, 1853.

887. THOMAS WOOD, of the Glue Works, Hunslet, in the parish of Leeds, Millwright, for Improvements in the mode of obtaining motive power.—Dated November 26, 1852. Sealed May 17, 1853.

942. PETER WALKER and ANDREW BARDAY WALKER, of King-street, Warrington, in the county of Lancaster, Brewers, for Improvements in fermenting ale and porter, and other liqaids.—Dated December 3, 1852. Sealed May 17, 1853.

961, JOSEPH CLIFF, of Wortley, in the parish of Leeds, Fire Brick Manufacturer, for Improvements in the mode of making and compressing bricks, lumps, tiles, quarries terra cotta, and other similar articles. —Dated December 4, 1852. Sealed May 17, 1853.

988. SAMUEL ASPINWALL GODDARD, of Birmingham, Merchant and Gun Manufacturer, for Improvements in the construction of pistols.—Dated December 7, 1852. Sealed May 17, 1853.

993. PETER ARMAND LECOMTE DE FONTAINEMOREAU, of No. 4, South-street, Finsbury, for Improvements in the machinery for applying metallic capsules. Dated December 16, 1852. Sealed May 17, 1853.—(A communication.)

1072. PETER ARMAND LECOMTE DE FONTAINEMOREAU, of No. 4, South-street, Finsbury, for An improved lamp, which I call "Lamp omnibus."—Dated December 16, 1852. Sealed May 17, 1853.—(A communication.)

1111. WILLIAM WILKINSON, of Nottingham, Frame-work Knitter, for Improvements in the manufacture of paper and pasteboard; and in the production of a substance applicable for veneers, pannels, and to many purposes to which gutta percha and papier machê are applicable. —Dated December 20, 1852. Sealed May 17, 1853.

1. WILLIAM WILKINSON, of Nottingham, Frame-work Knitter, for Improvements in taps and other apparatus for filtering and drawing off liquids.—Dated January 1, 1853. Sealed May 17, 1853.

60. RICHARD WALKER, of Birmingham, Percussion Cap Manufacturer, for Improvements in the manufacture of buttons.—Dated January 8, 1853. Sealed May 17, 1853.

330. WILLIAM ROMAINE, of Sackville-street, Piccadilly, in the county of Middlesex, Civil Engineer, for Improvements in rendering wood more durable and uninflammable.—Dated February 7, 1853. Sealed May 17, 1853.

404. JOSEPH SKERTCHLY, of Kingsland, Middlesex, for Improvements in copying presses.—Dated February 16, 1853. Sealed May 17, 1853.

412. WILLIAM BRIDGES ADAMS, of Adam-street, Adelphi, in the county of Middlesex, Engineer, for Improvements in railways.—Dated February 17, 1853. Sealed May 17, 1853.

510. WILLIAM EDWARD NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Civil Engineer, for Improvements in capstans. Dated March 1, 1853. Sealed May 17, 1853.—(A Communication.)

568. GODFREY SIMON and THOMAS HUMPHREYS, of the State of Pennsylvania in the United States of America, for Improvements in carriages.—Dated March 7, 1853. Sealed May 17, 1853.

630. ROBERT CHRISTOPHER WITTY, of No. 1, Portland-place, Wandsworth-road, in the county of Surrey, Engineer, for Improvements in the manufacture of gas.—Dated March 12, 1853. Sealed May 17, 1853.

643. THORNTON JOHN HERAPATH, of Bristol, Analytical Chemist, for Improvements in treating sewage and in manufacturing manure therefrom.—Dated March 15, 1853. Sealed May 17, 1853.

654. SAMUEL COLT, of Spring-gardens, in the county of Middlesex, Gentleman, for Improved apparatus for heating and annealing metals.—Dated March 16, 1853. Sealed May 17, 1853.

655. JOHN OLIVER, of Newcastle-upon-Tyne, Manufacturing Chemist, for Improvements in the manufacture of a red pigment commonly called venetian red.—Dated March 16, 1853. Sealed May 17, 1853.

659. WILLIAM BLINKHORN, of Sutton, in the county of Lancaster, Glass Manufacturer, for Certain improvements in the construction of furnaces and annealing kilns employed in the manufacture of glass.—Dated March 17, 1853. Sealed May 17, 1853.

660. GEORGE JOHNSON, of Stockport, in the county of Chester, M.D., for Certain improvements in looms for weaving.—Dated March 17, 1853. Sealed May 17, 1853.

666. WILLIAM KING WESTLY, of Leeds, Flax Machinist, for An improved comb or gill for heckling, drawing, roving, and otherwise preparing to be spun hemp, flax, tow, silk, wool, and other fibrous substance.—Dated March 18, 1853. Sealed May 17, 1853.

677. GEORGE ROSS, of Hatton-garden, in the city of London, Merchant, for An improved manufacture of lubricating oil, and a mode or modes of applying such oil to the purposes of lubrication.—Dated March 18, 1853. Sealed May 17, 1853.—(A communication.)

685. SAMUEL RADCLIFFE, of Oldham, in the county of Lancaster, Cotton Spinner, and KNIGHT WILLIAM WHITEHEAD, of the same place, Manager, for Certain improvements in machinery or apparatus for grinding or setting the surfaces of cylinders and rollers employed in carding-engines.—Dated March 19, 1853. Sealed May 17, 1853.

686. ALFRED VINCENT NEWTON, of No. 66, Chancery-lane, in the county of Middlesex, Mechanical Draughtsman, for An improved construction of oil lamp.—Dated March 19, 1853. Sealed May 17, 1853. —(A communication.)

690. MOSES POOLE, of the Avenue-road, Regent's Park, in the county of Middlesex, for Improvements in generating steam and other vapours.—Dated March 21, 1853. Sealed May 17, 1853.—(A Communication.)

691. JEAN MARIE DURNERIN, of Paris, for Improvements in apparatus for extracting liquid out of solid substances, specially applicable to the treatment of fatty matters.—Dated March 21, 1853. Sealed May 17, 1853.

692. MOSES POOLE, of the Avenue-road, Regent's Park, in the county of Middlesex, for Improvements in obtaining power where air is employed.—Dated March 21, 1853.—Sealed May 17, 1853.—(A communication.)

693. ISAAC TAYLOR, of Standford Rivers, in the county of Essex,

Gentleman, for Improvements in machinery for printing woven and other fabrics.—Dated March 21, 1853. Sealed May 17, 1853.

701. WILLIAM JOHNSON, of No. 47, Lincoln's-inn-fields, in the county of Middlesex, Civil Engineer, for Improvements in rolling and shaping malleable metals.—Dated March 22, 1853. Sealed May 17, 1853.—(A communication.)

703. FREDERICK FUTVOYE, of Regent-street, in the county of Middlesex, Merchant, for An improved apparatus to be employed in games of chance.—Dated March 22, 1853. Sealed May 17, 1853.

714. WILLIAM PRIOR SHARP, of Manchester, Engineer, for Certain Improvements in machinery for spinning and doubling cotton and other fibrous substances.—Dated March 24, 1853. Sealed May 17, 1853.

736. AUGUSTIN CHRYSOSTOME BERNARD and JACQUES MARIE PIERRE ALBERIC DE ST. ROMAN, of Paris, Gentlemen, for An improved mode of giving publicity.—Dated March 28, 1853. Sealed May 17, 1853.

739. SAMUEL FOX, of Stockbridge Works, Deepcar, near Sheffield, for An improvement in the frames of umbrellas and parasols.—Dated March 28, 1853. Sealed May 17, 1853.

762. JAMES BOWRON, of Tyne and Tees, Glass Works, South Shields, for Improvements in the manufacture of crown, sheet, plate, and bottle glass.—Dated March 30, 1853. Sealed May 17, 1853.

764. ROBERT DALGLISH, of Glasgow, Calico Printer, for An improvement in dyeing.—Dated March 30, 1853. Sealed May 17, 1853.

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TO

VOL. XXI.—ENLARGED SERIES.

Macintosh, Printer, Great New-street, London.

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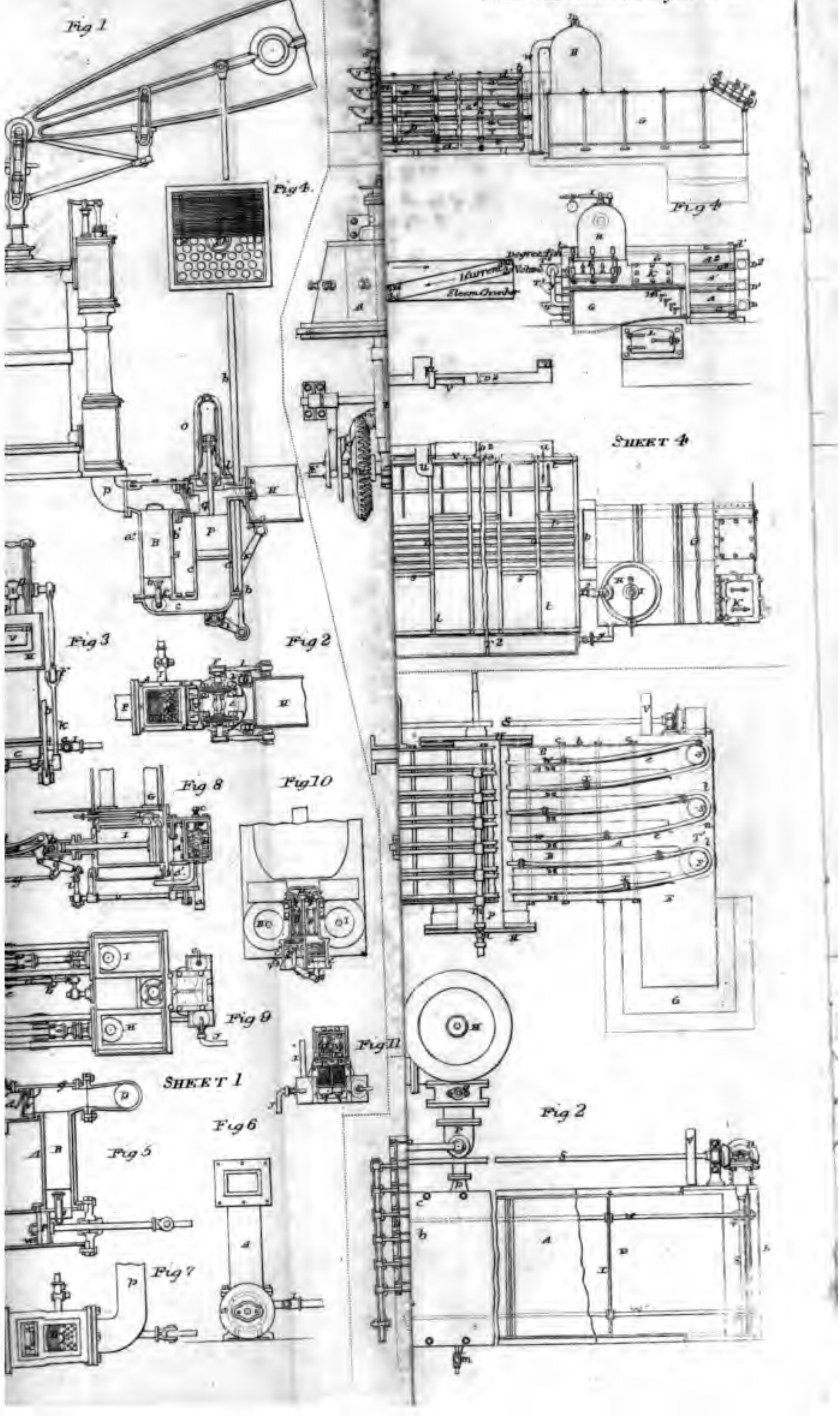

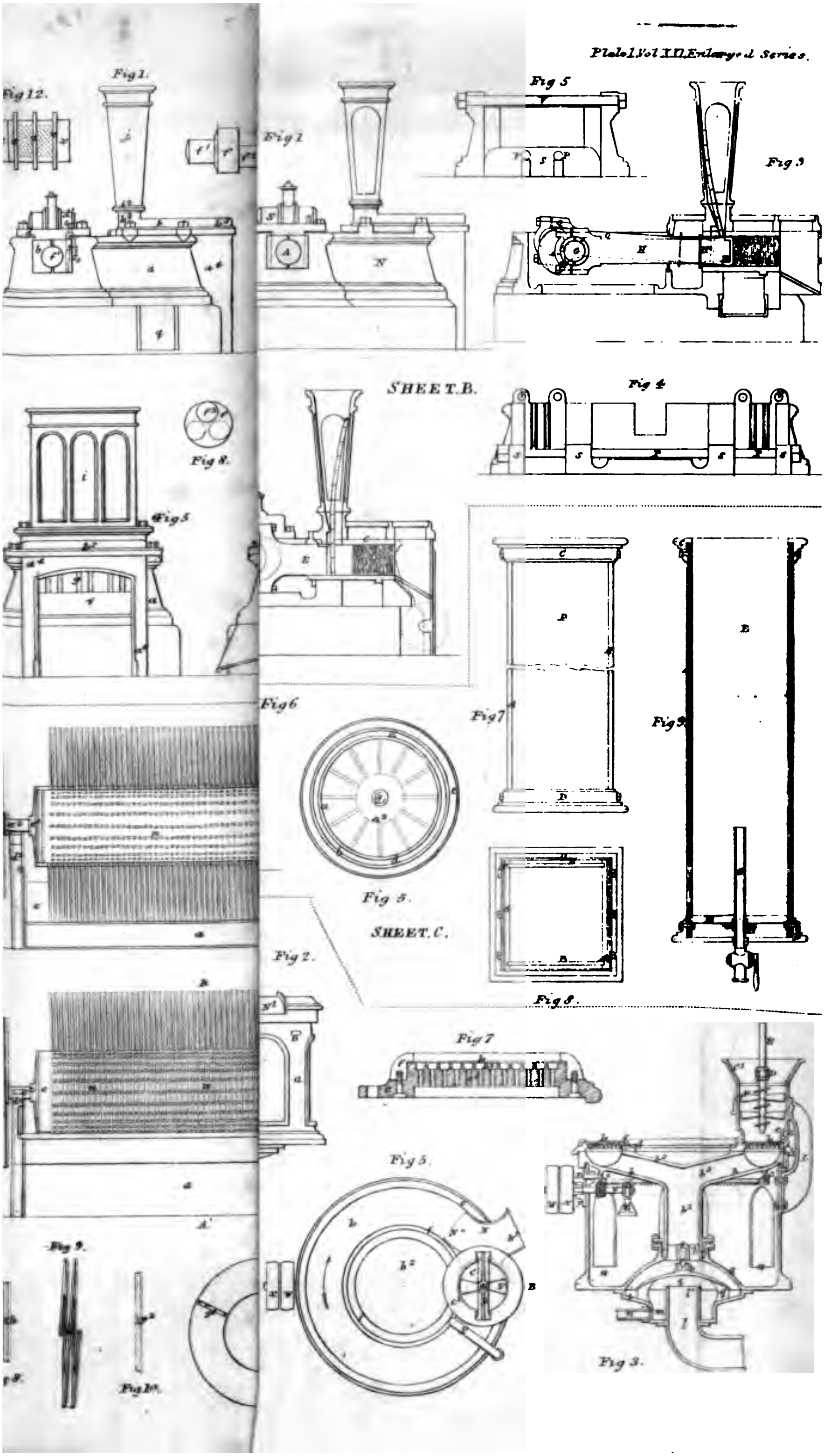
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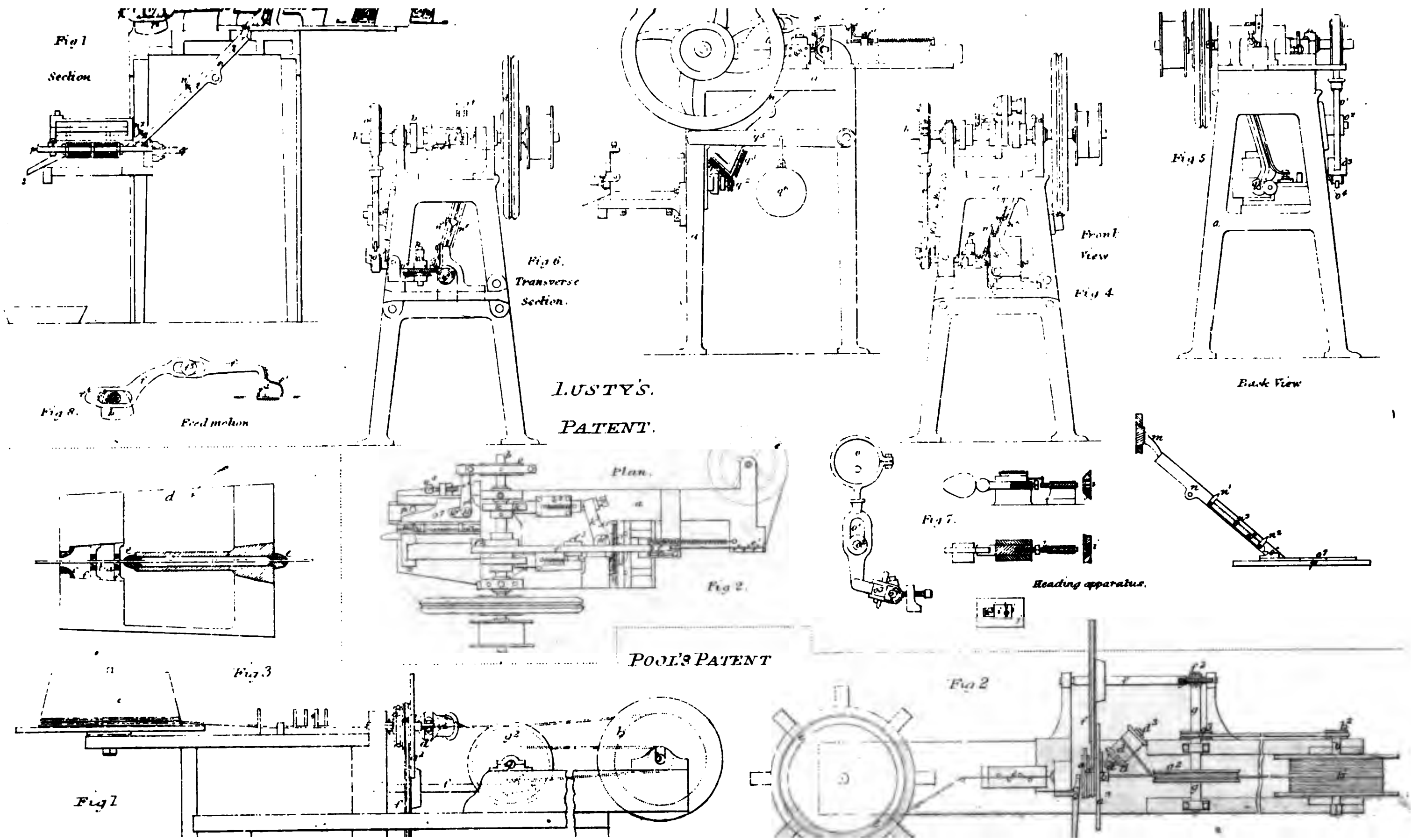
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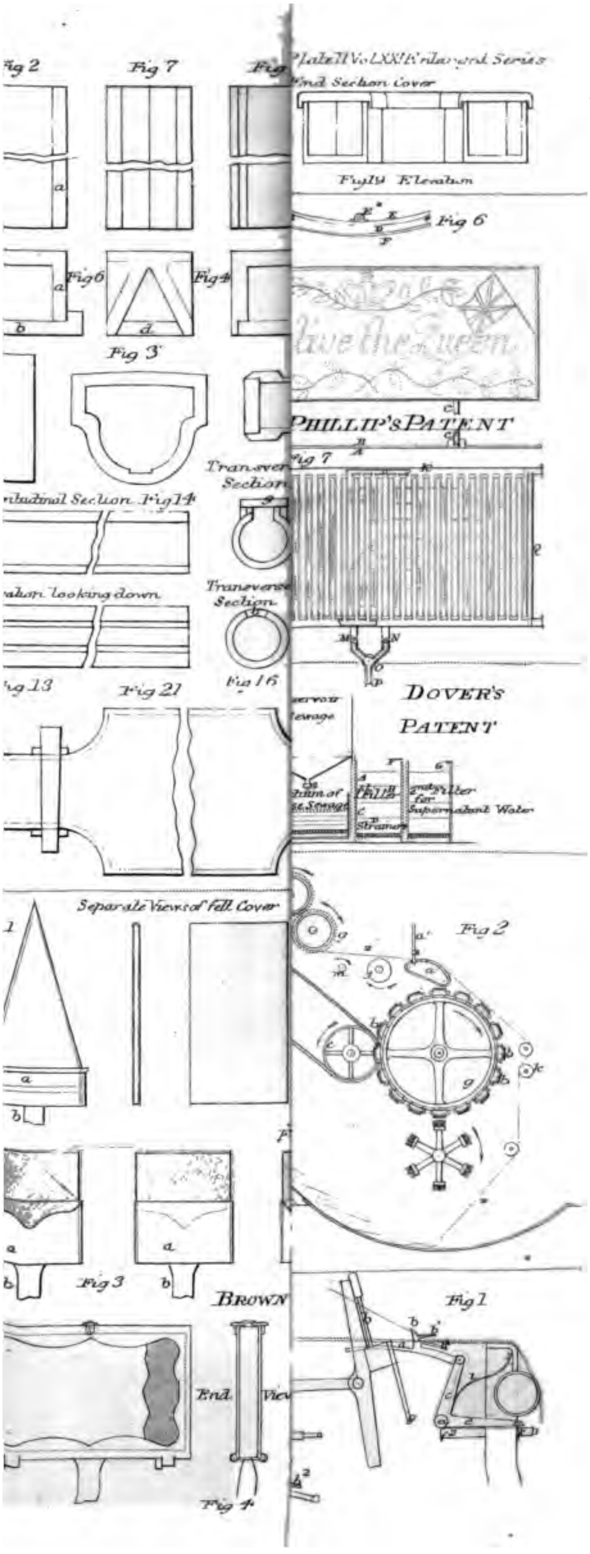
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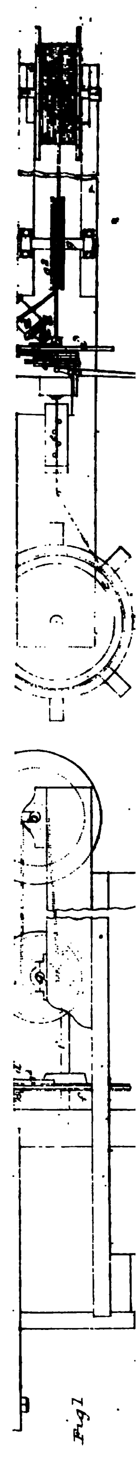
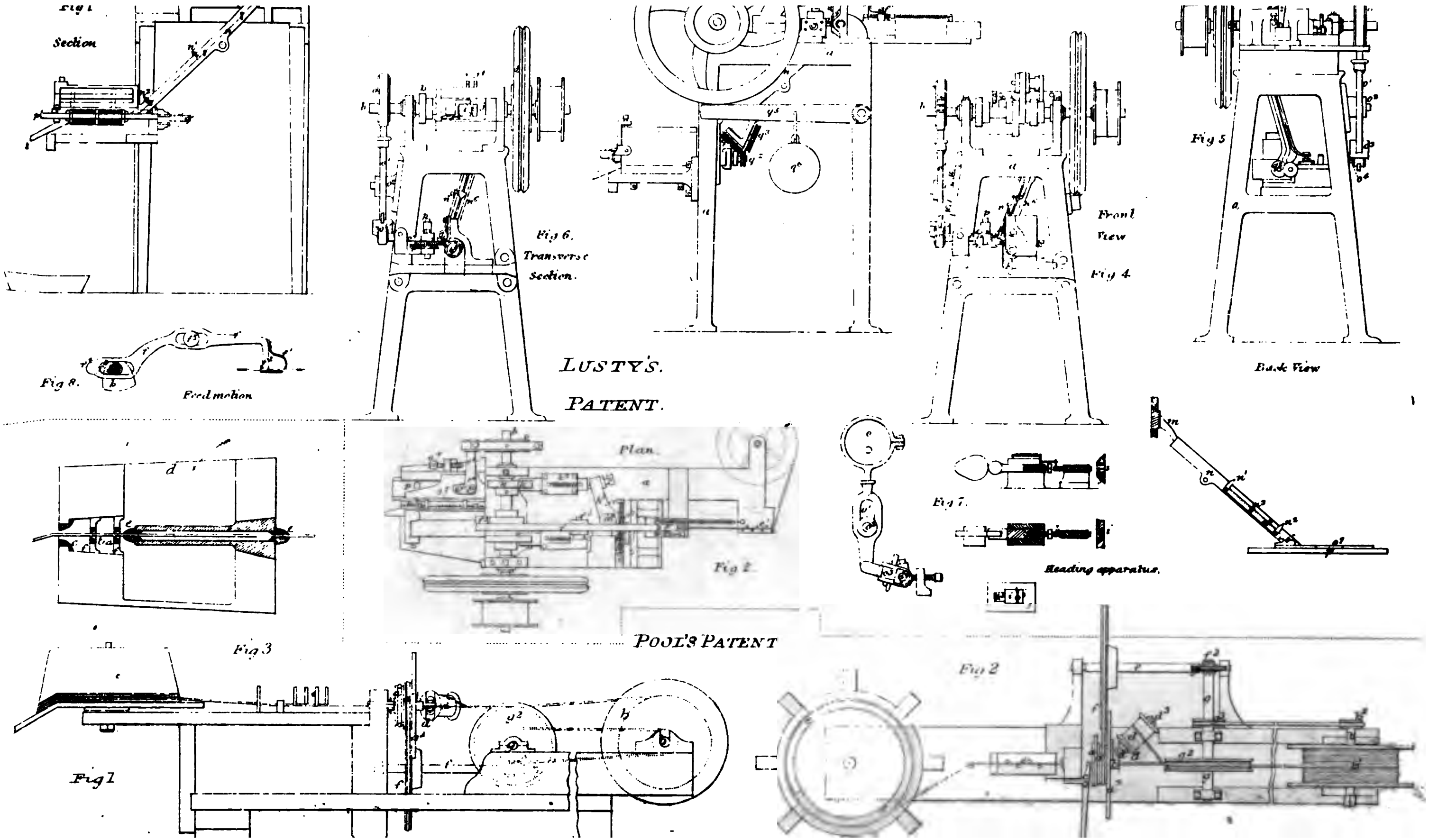


Fig 1



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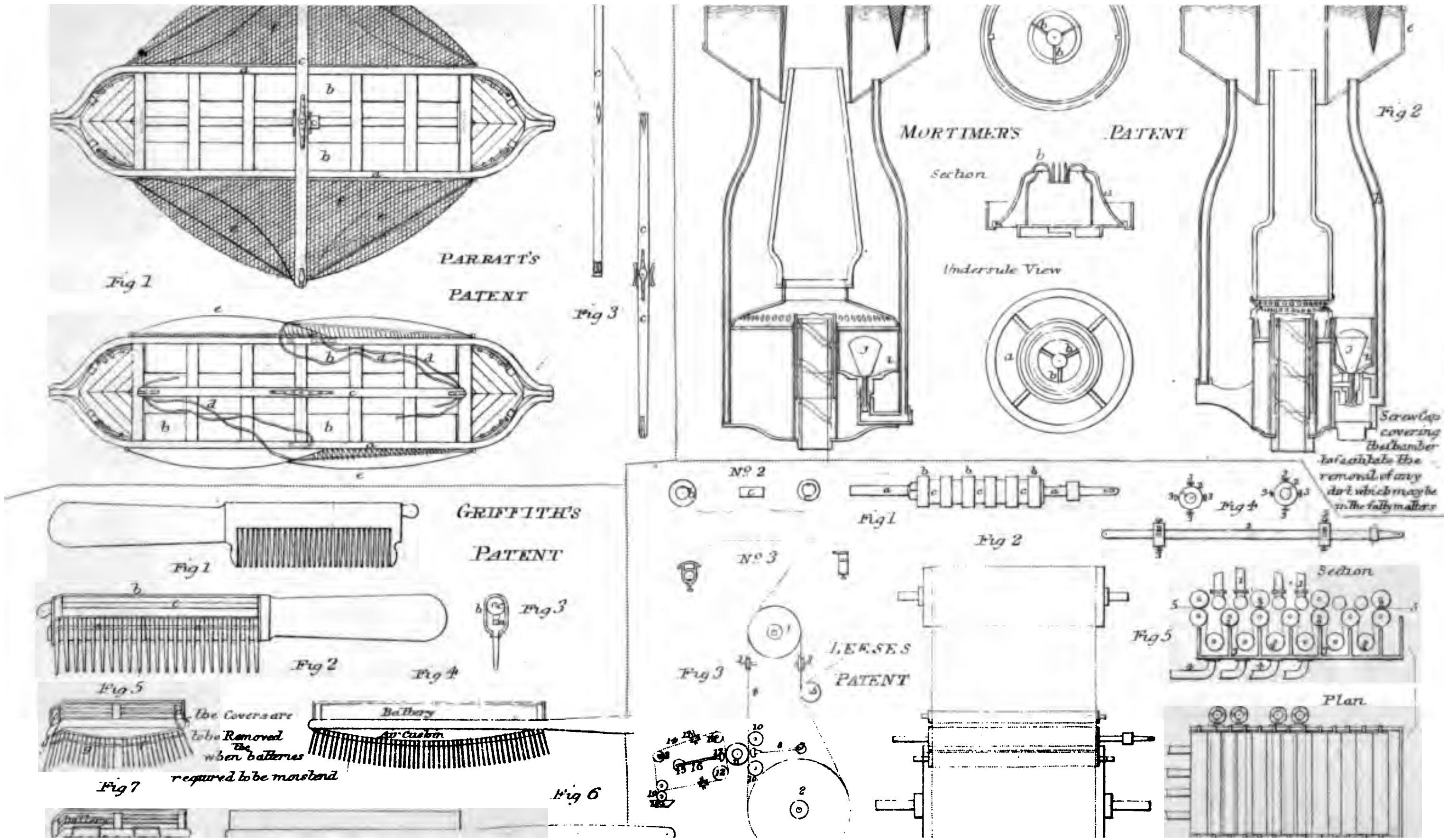
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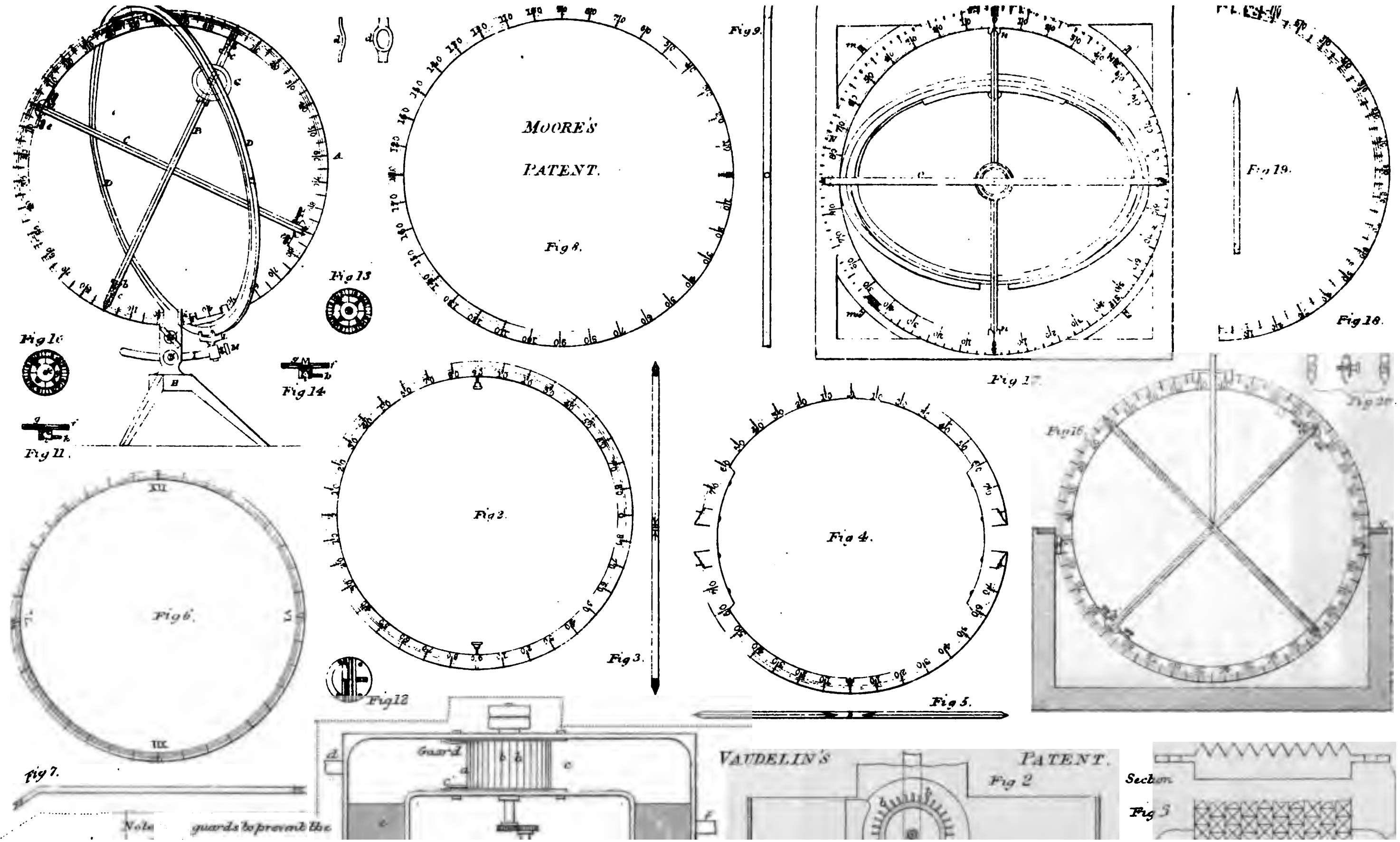
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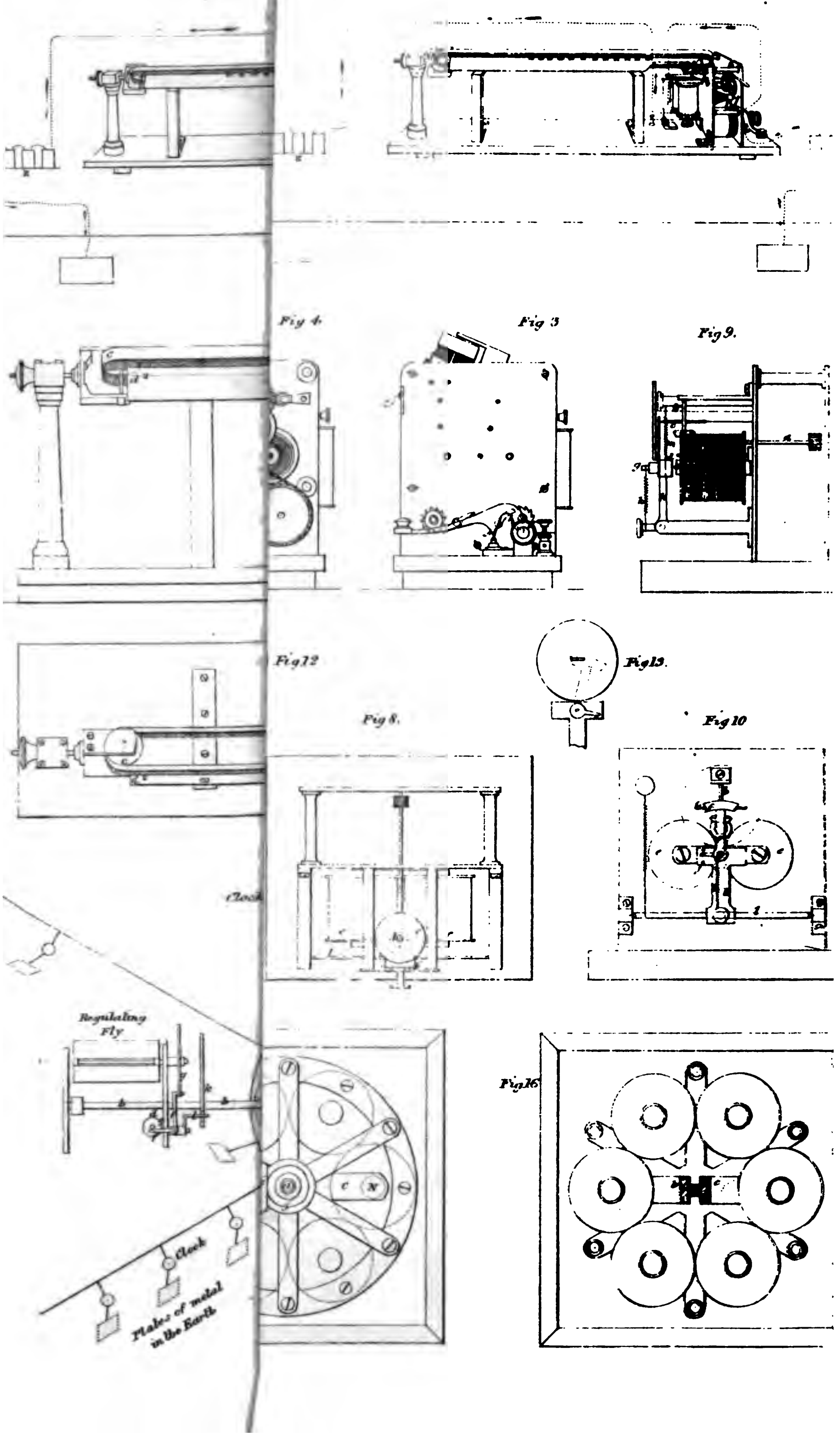
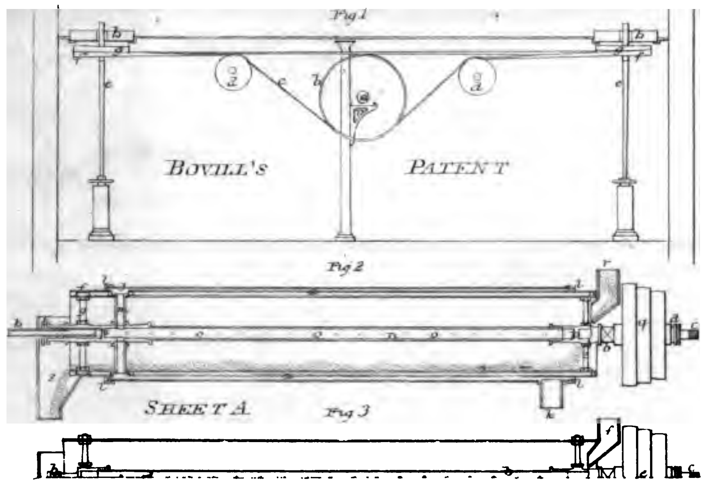
Plate VIII. Vol XXI Enlarged

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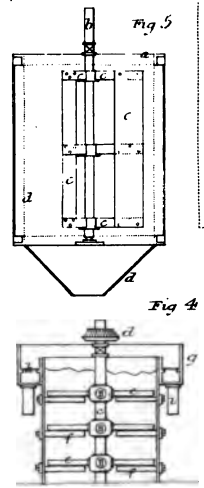
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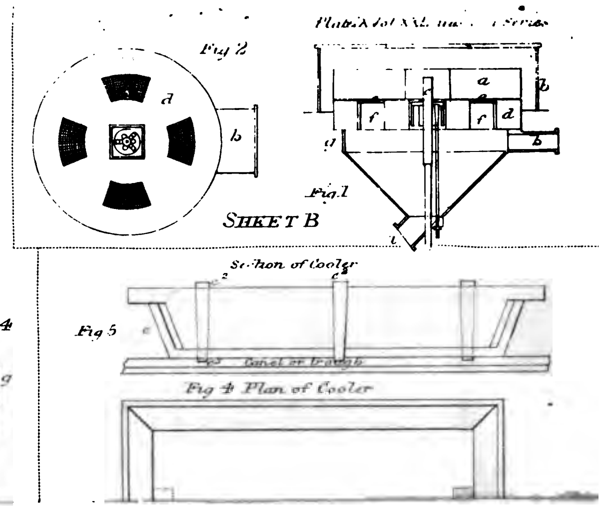
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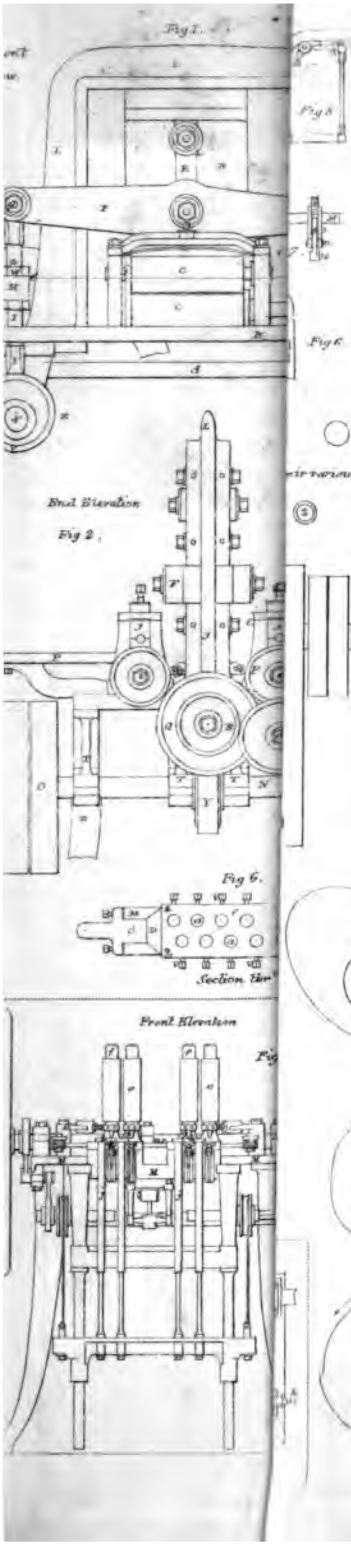
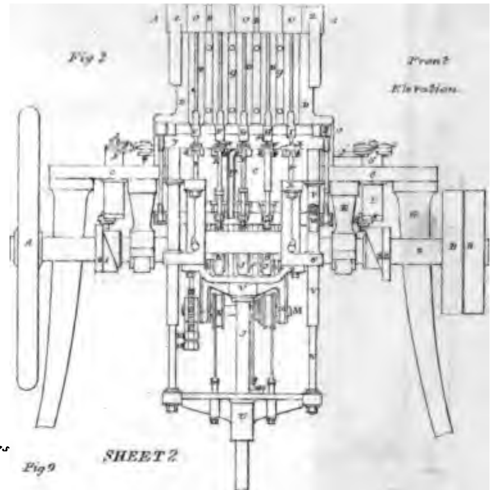
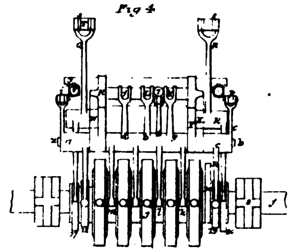




Plan
Fig 4



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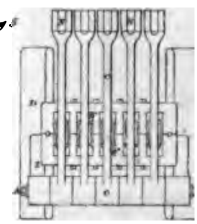
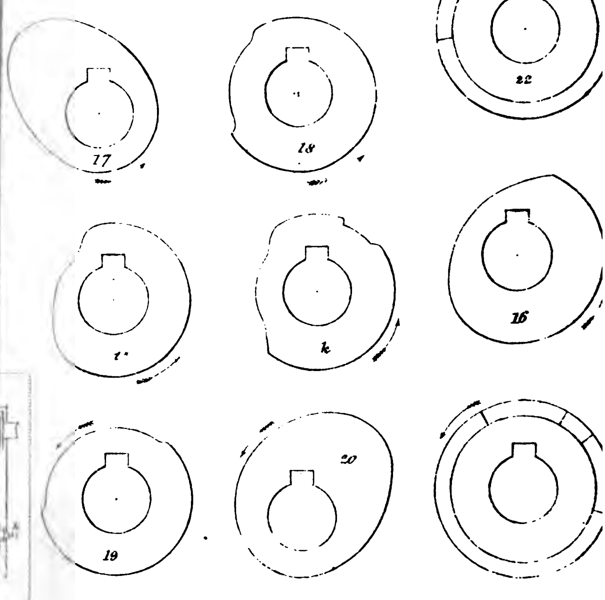
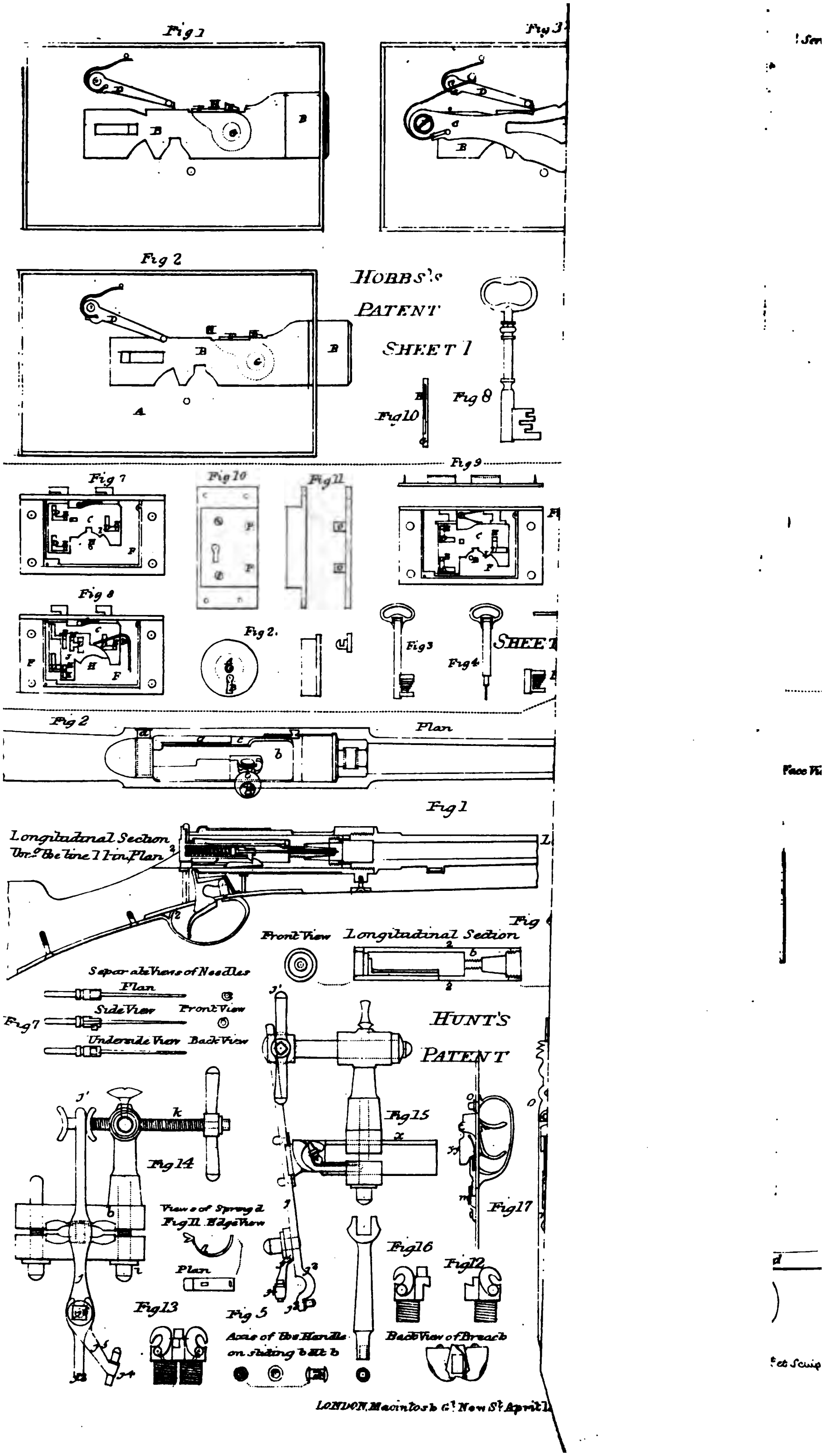
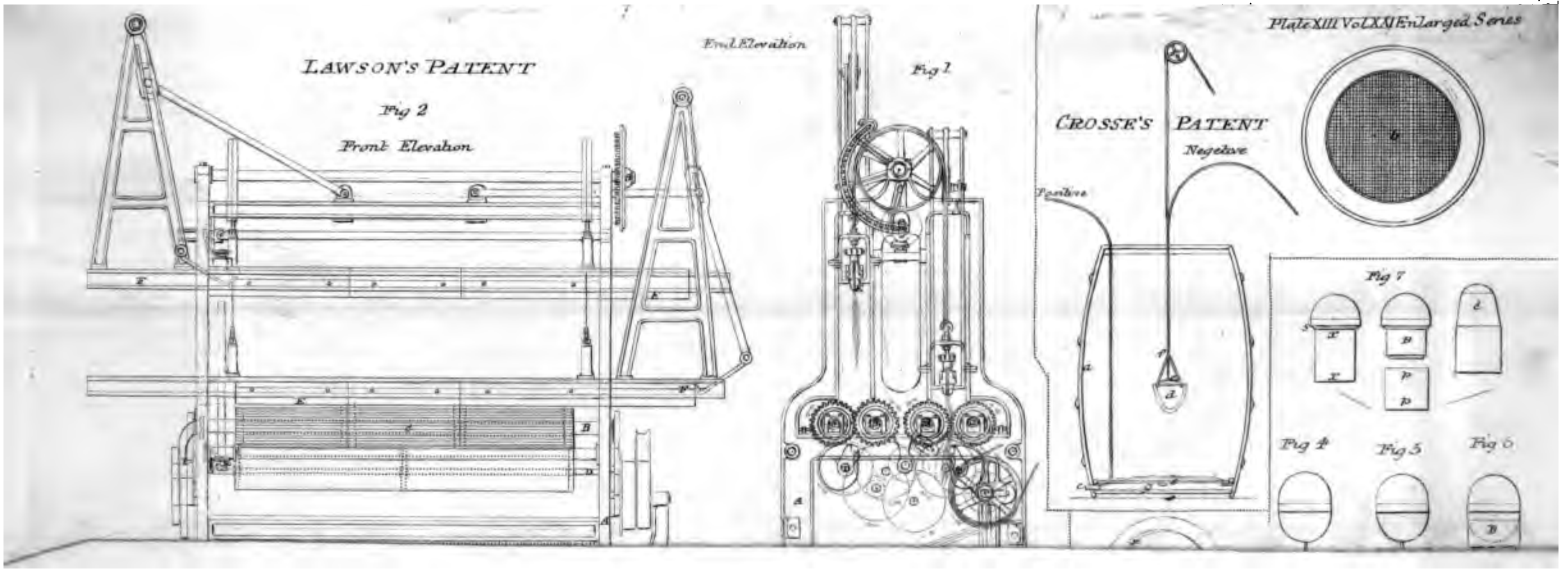


Seperate Views of the Cams
in Shaft F. Sheet 2.





LONDON. Macintosh Gt New St April



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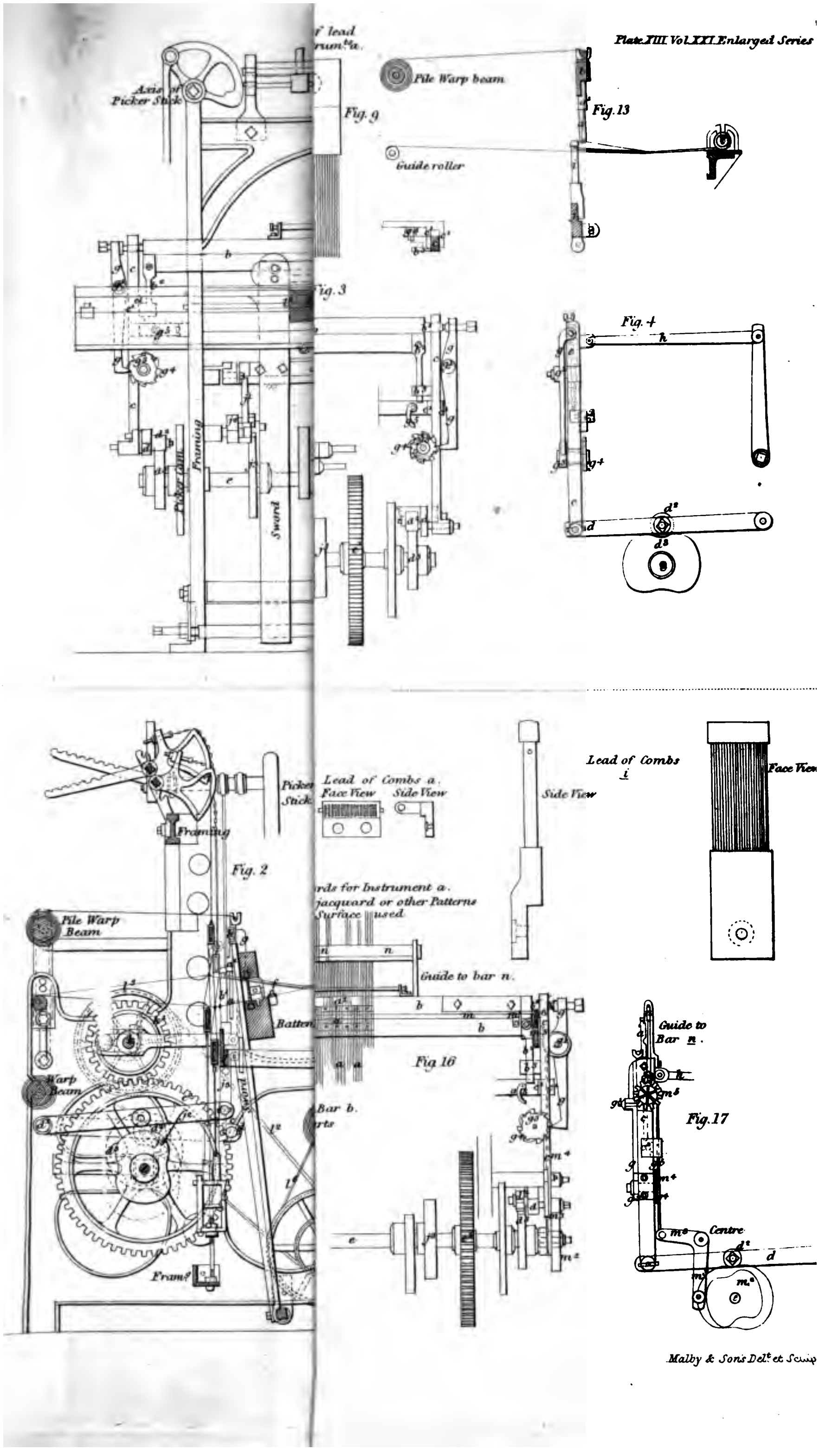

Malby & Sons Del^t et Sculp

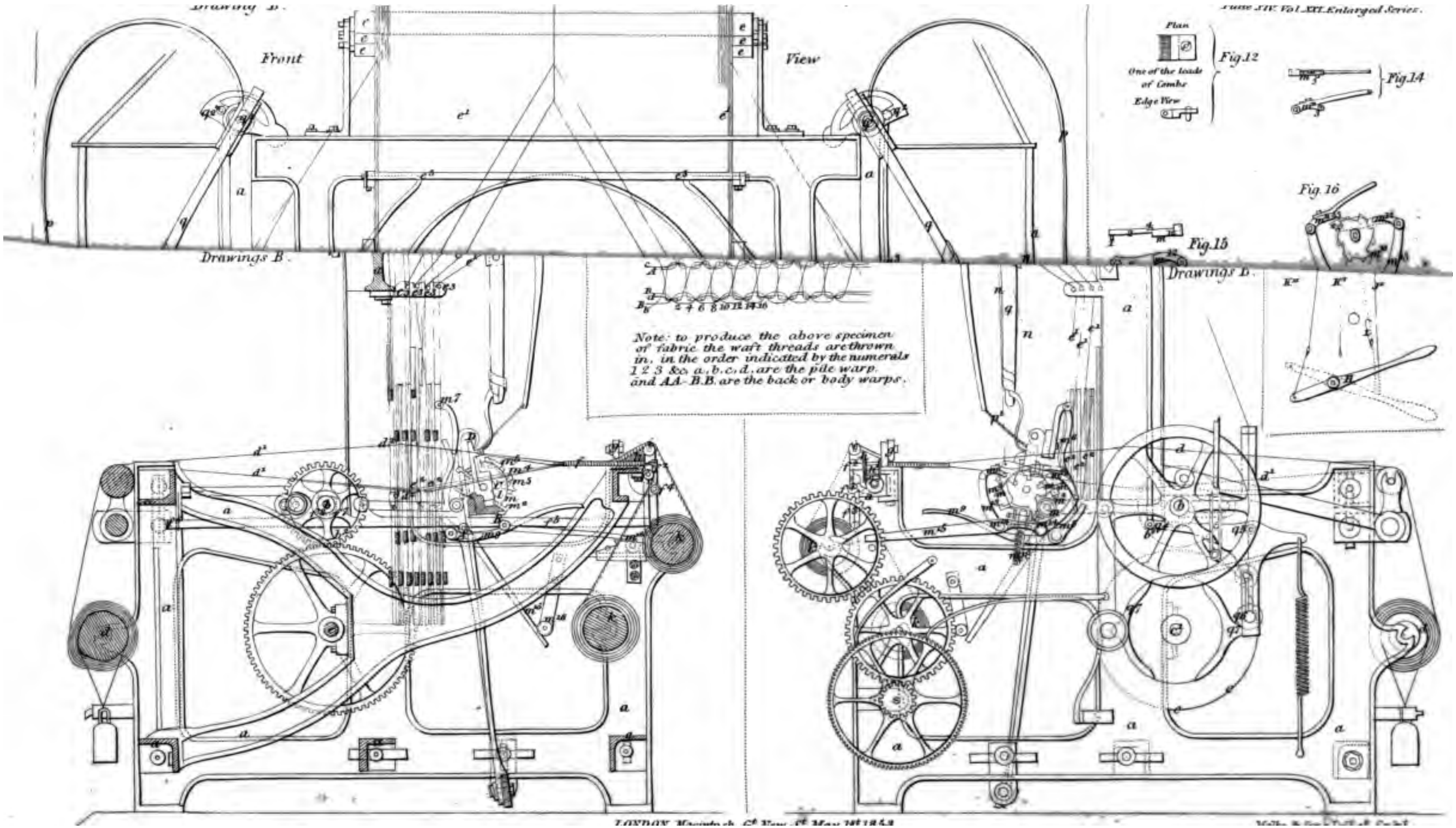
Plate XIV. Vol XXI. Enlarged Series.
Front
View
Drawings B.
Drawings B.
Fig. 12
Plan
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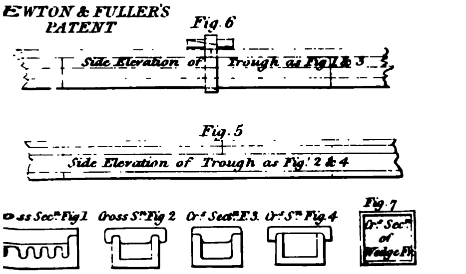
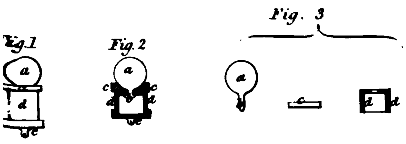
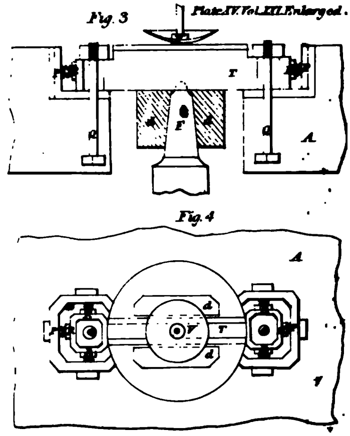
Fig. 14
Fig. 15
Fig. 16
Note: to produce the above specimen of fabric the waft threads are thrown in, in the order indicated by the numerals 1 2 3 &c. a. b. c. d. are the pile warp. and AA-BB. are the back or body warps.

NEWTON & FULLER'S PATENT

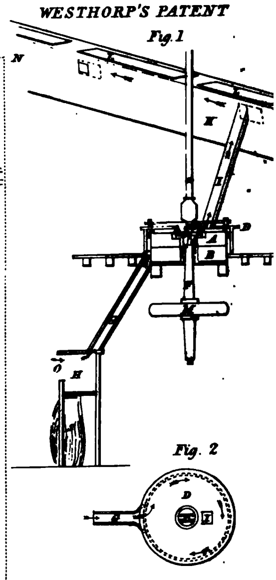


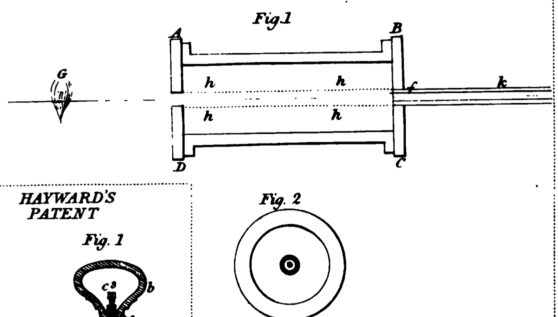
ADAMS'S PATENT





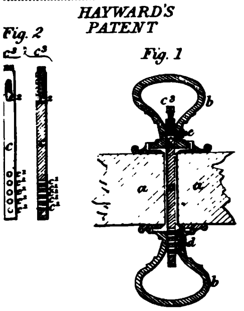
WESTHORP'S PATENT



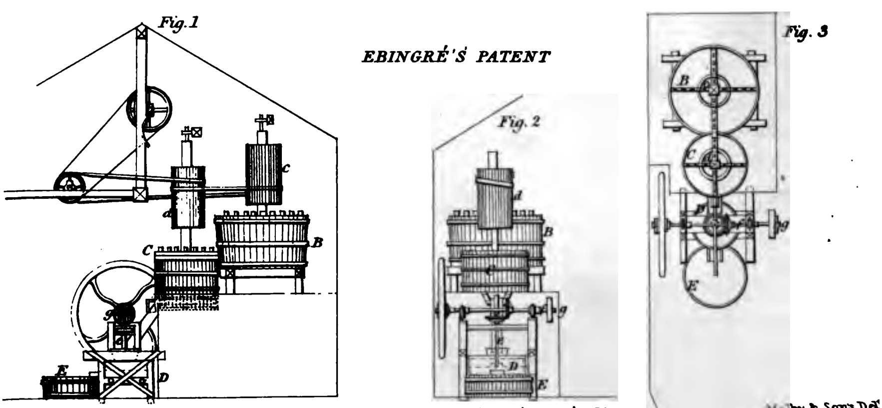


LORD DUNDONALD'S PATENT

HAYWARD'S PATENT



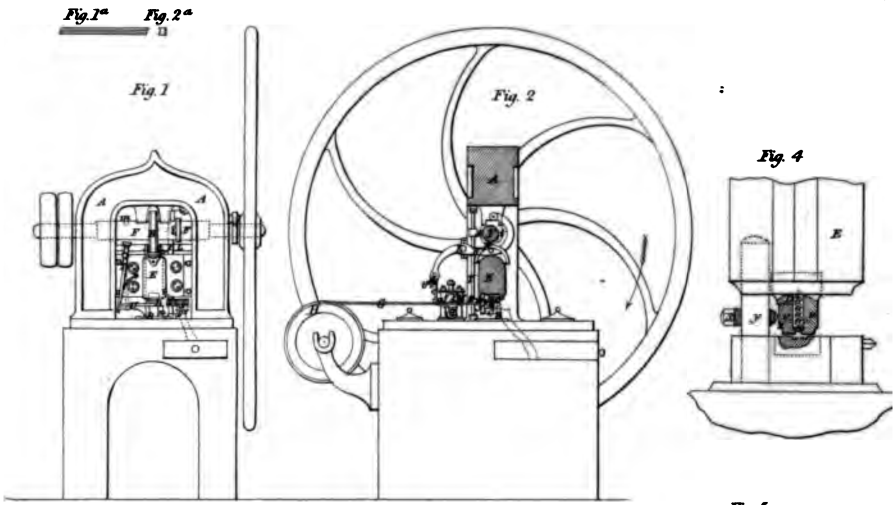
EBINGRÉ'S PATENT

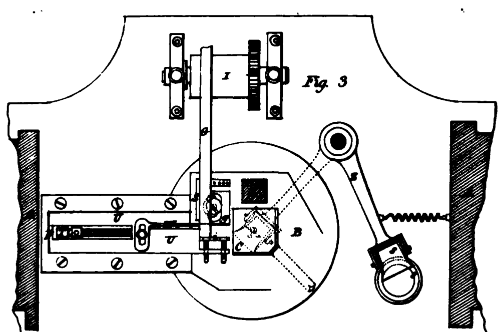


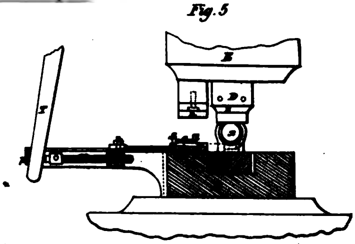
LONDON. Macintosh 6 New St. May 1st 1853.

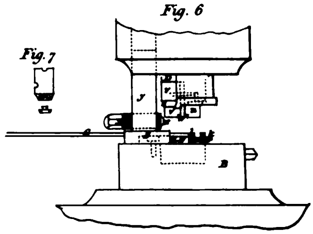
Malby & Sons Del.

JUDE'S PATENT



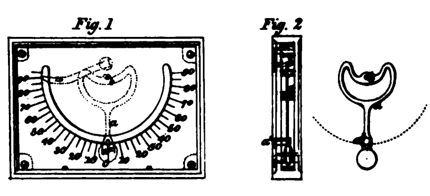




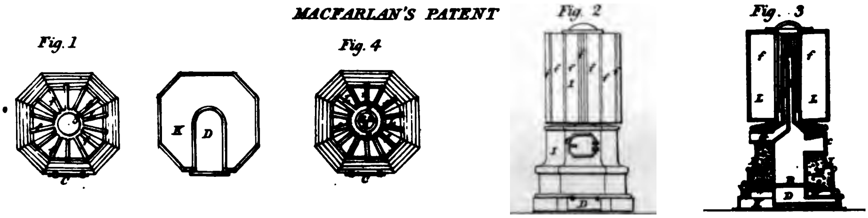


JOSHUA SMITH'S PATENT

LAVATER'S PATENT



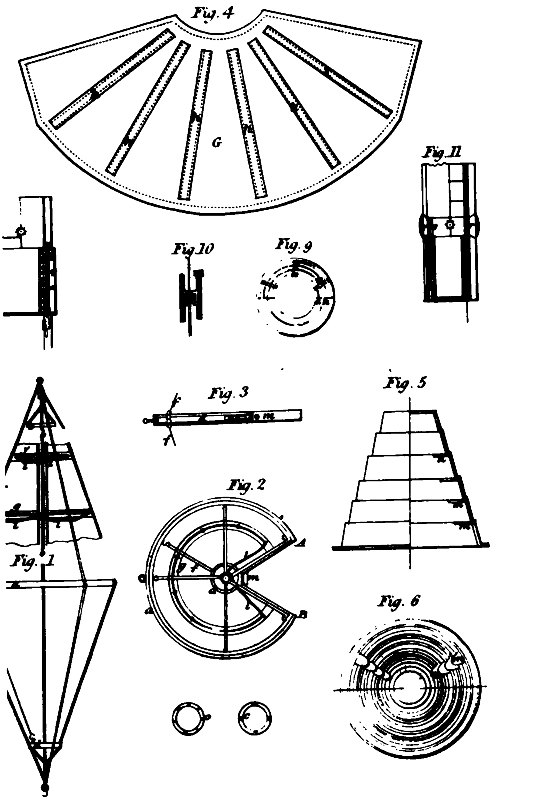
MACFARLAN'S PATENT



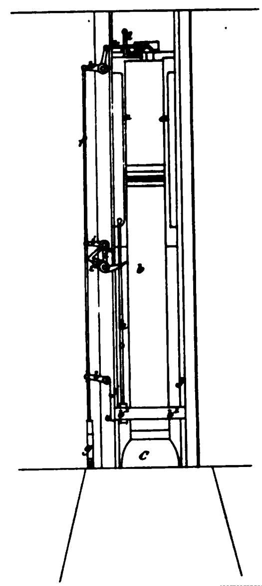
LONDON Macintosh 6 New St. June 1st 1853.

Malby & Son's Del. et Sculp

REDL'S PATENT

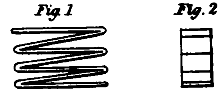


HILL'S PATENT

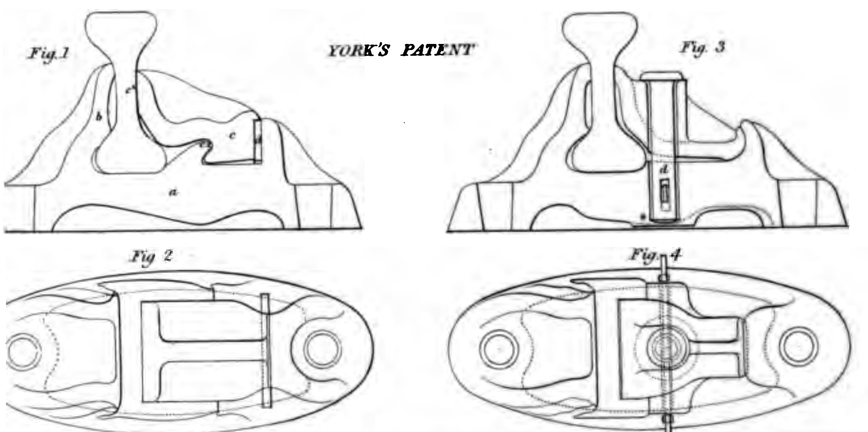


WEBSTER'S PATENT

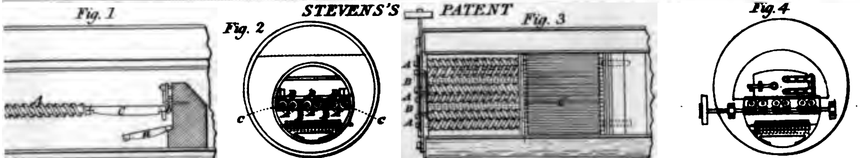
Fig. 1 Fig. 2



YORK'S PATENT



STEVENS'S PATENT



LONDON, Macintosh & New St. June 1st 1853.

Malby & Sons Del. et Sc.

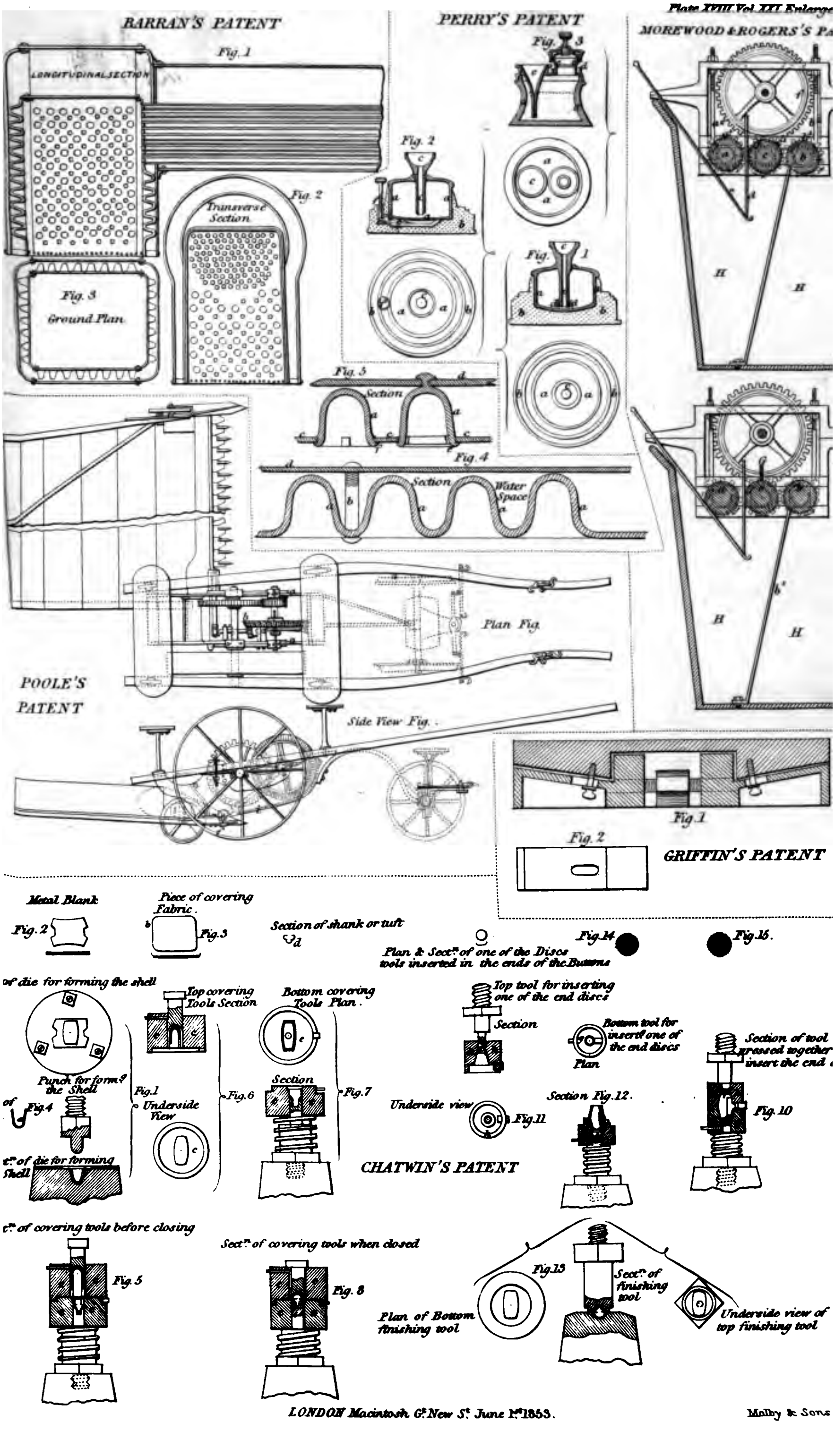
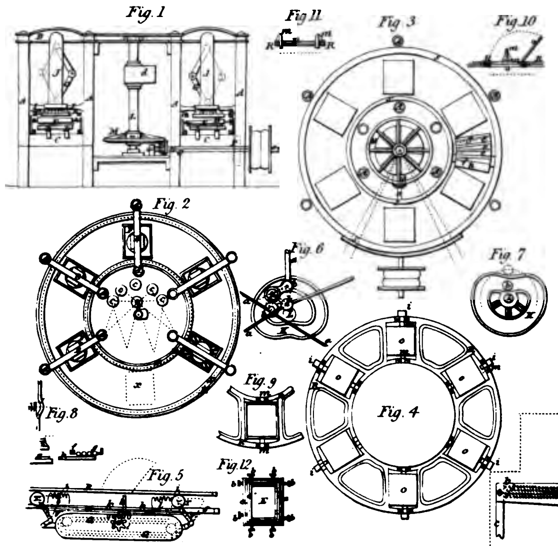
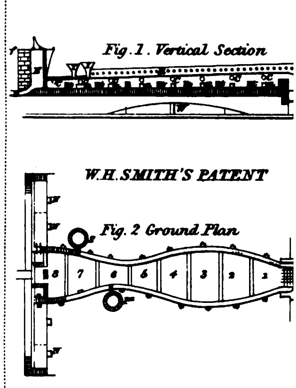


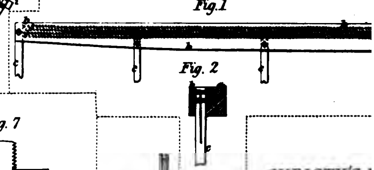
Plate XVIII Vol. XXI Enlarged
BARRAN'S PATENT
Fig. 1
LONGITUDINAL SECTION
Fig. 2
Transverse Section
Fig. 3
Ground Plan
PERRY'S PATENT
Fig. 3
Fig. 2
Fig. 1
Fig. 5
Section
Fig. 4
Section
Water Space
MOREWOOD & ROGERS'S PA
H
POOLE'S PATENT
Plan Fig.
Side View Fig.
Fig. 1
Fig. 2
GRIFFIN'S PATENT
Metal Blank
Fig. 2
Piece of covering Fabric.
Fig. 3
Section of shank or tuft
Fig. 14
Fig. 15.
Plan & Sectn. of one of the Discs tools inserted in the ends of the Buttons
of die for forming the shell
Top covering Tools Section
Bottom covering Tools Plan.
Top tool for inserting one of the end discs
Section
Bottom tool for insertg one of the end discs
Plan
Section of tool pressed together insert the end
Punch for formg the Shell
Fig. 4
Fig. 1
Underside View
Fig. 6
Section
Fig. 7
Underside view
Fig. 11
Section Fig. 12.
Fig. 10
ctn. of die for forming Shell
CHATWIN'S PATENT
ctn. of covering tools before closing
Fig. 5
Sectn. of covering tools when closed
Fig. 8
Fig. 13
Sectn. of finishing tool
Plan of Bottom finishing tool
Underside view of top finishing tool

GOVER'S PATENT

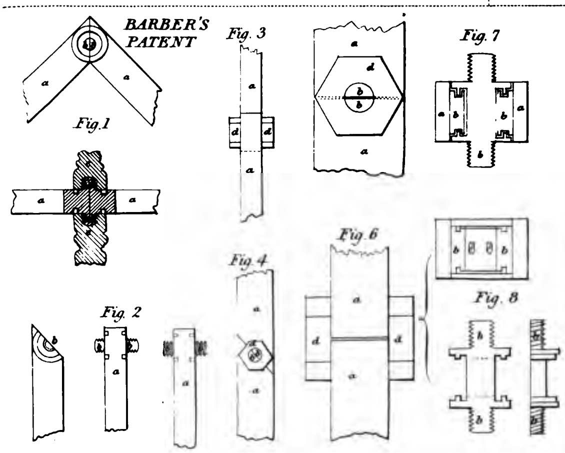




BROCKBANK'S PATENT



BARBER'S PATENT



CHRISTY'S PATENT